PETROLEUM

PUBLICATIONS, MAPS
AND SERVICES

CATALOGUE

OCTOBER, 1984

Manitoba
Energy and Mines
Petroleum

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Manitoba Energy and Mines - Petroleum Publications, Maps and Services Catalogue

Foreword

One of the major functions of the Manitoba Department of Energy and Mines is to encourage exploration and development of the Province's crude oil and natural gas resources in an orderly, safe and efficient manner. In support of this function, the Petroleum Branch has compiled this catalogue which provides a comprehensive list of information and services available to industry and the public.

The catalogue is made up of two main sections:

- Section I contains information of a general nature for those who are not familiar with Manitoba's petroleum and natural gas resources. Contained in this section is an overview of the geological setting including petroleum producing areas and a brief outline of the responsibilities and functions of the Manitoba Petroleum Branch.

- Section II contains a comprehensive listing of the information and services available and is arranged under four subsections. Some information is held confidential for a specified time before release for publication or examination, but most non-confidential information is listed in this section.

All requests for information should be directed to the following address or phone number:

Manitoba Energy and Mines
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

Phone: (204) 945-6577

Note:

a) Where charges are stated, prepayment is requested (cheques or money orders should be made payable to the Minister of Finance - Manitoba).
b) Unless otherwise requested, out-of-province orders will be sent by regular postal delivery. Special delivery requests will be sent "collect".
c) The catalogue price list is effective October 1, 1984, but is subject to change without notice.
d) For U.S. orders - when making payment, please make payable in Canadian funds as: i) Postal Money Order; or ii) Bank Draft.
e) A service fee may be assessed for some information retrieval, shipping or mailing. Please inquire when ordering.

f) The Petroleum Branch has on file technical records of all non-confidential wells drilled within the Province. Files may include the original well licence application forms, survey plan, drilling prognosis, well summary form, historical production record, core analyses, drill stem test reports, reservoir fluid analyses, absolute open flow test results and other pressure measurements, logs, drilling and service rig tour reports, and well completion reports.

These records can be examined at either the Winnipeg, Virden or Waskada district offices, or reproduced and forwarded at a cost of $0.25 per sheet.

g) A complete library of cores and samples from non-confidential wells drilled in Manitoba is maintained at the Department's core storage facilities in Winnipeg. Arrangements for the examination of this material may be made through the Branch office in Winnipeg. Please note that microscopes are not provided. An index of core information on Manitoba wells is available in the Winnipeg office.

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Section 1 - Overview

I. Geological Setting of Manitoba

The sedimentary strata in Manitoba occur in two distinct regions - the southwestern plains area and the far north Hudson Bay lowlands area. These two regions are related to two distinct tectonic settings - the Williston Sedimentary Basin to the southwest, and the Hudson Bay Sedimentary Basin to the northeast. The location of Manitoba in relation to these two Basins is shown on Figure 1. Approximately 40% of the total area of the Province is underlain by sedimentary strata of Paleozoic, Mesozoic, and Cenozoic ages.

The Paleozoic and Mesozoic strata of southwestern Manitoba occur as a wedge-like segment on the northeastern flank of the Williston Sedimentary Basin. A schematic cross-section through the sedimentary strata of southwestern Manitoba is presented in Figure 2. As in most of western Canada, a major angular unconformity marks the contact between Paleozoic and Mesozoic beds in Manitoba. The dominant lithologies in the Paleozoic system are limestones, dolomitic limestones, and argillaceous limestones. Evaporites are also common along with sands and shales which become more important towards the base of the Paleozoic. In contrast, shales, silts and sands dominate in the Mesozoic sequence occurring above the unconformity. These Jurassic and Cretaceous beds dip more gently to the southwest than the underlying Paleozoic beds.

A Table of Geological Formations in southwestern Manitoba is presented in Figure 3. The total thickness of the sedimentary strata exceeds 2 300 metres in the extreme southwestern corner of the Province.

The Paleozoic strata of the Hudson Bay lowlands represent the southwestern flank of the Hudson Bay Sedimentary Basin. Onshore stratigraphic tests have indicated a maximum sedimentary thickness of approximately 1 000 metres while geophysical data and drilling have suggested that the sedimentary thickness may exceed 2 500 metres in the central offshore parts of the Basin. The sedimentary strata present in northeastern Manitoba are Ordovician, Silurian and Devonian in age.

II. Oil Production in Manitoba

In January 1951, the California Standard Company completed the first "discovery well" in Manitoba. Located on Lsd. 15-18-10-27 WPM, this well lies within the Daly Field, approximately 17 kilometres west of the Town of Virden. The discovery sparked a "boom" of activity which led to the discovery and development of hundreds of productive oil wells.

The principal oil fields and producing areas in Manitoba are presented in Figure 4.

The three largest producing Fields in Manitoba are Virden, Waskada and Daly (in descending order). Total crude oil production in 1983 was 737 052 cubic metres. As of June 30, 1984, there were a total of 1,234 wells classified as capable of oil production in Manitoba.

The bulk of oil production in southwestern Manitoba occurs in carbonates of the Mississippian Lodgepole and Mission Canyon Formations. The trapping mechanisms are primarily stratigraphic with oil accumulations being found where porous reservoir strata are truncated at the pre-Jurassic erosional

surface. Structural and lithological factors are also known to control oil accumulation to some extent.

In June 1980, a former Mississippian producer in the Waskada Field was recompleted in the Jurassic Lower Amaranth Formation marking the first non-Mississippian oil production in the province. The field has since been developed to include over 200 producing wells.

A further discovery in July 1983 near St. Lazare has revealed the presence of accumulations of medium gravity oil in the Jurassic Melita (Shaunavon) Formation. Work is currently being carried out to define the potential of the area.

Very little work has been done to date to explore for oil beneath Mississippian strata in Manitoba. These deeper strata are thought to be highly prospective but exploration efforts have been hampered by the lack of deep well data. Figure 5 shows the location of all wells drilled to the Precambrian basement in a portion of southwestern Manitoba as of June 30, 1984.

Several pre-Mississippian formations present in Manitoba are known to have good reservoir characteristics and are productive elsewhere to the south and west in the Williston Basin. These include the Cambrian Deadwood, the Ordovician Winnipeg and Red River, the Silurian Interlake and the Devonian Winnipegosis, Dawson Bay, Duperow and Nisku Formations.

Potential reservoir beds are also known to exist in the Ordovician and Silurian strata of the Hudson Bay lowlands in northeastern Manitoba. Limited exploration activity has left the petroleum prospects of the Hudson Bay Basin largely unevaluated at this time.

More recently, however, seismic programs covering approximately 14 000 km were conducted offshore. If these seismic programs yield promising results two or more offshore wells may be drilled in 1986 or 1987.

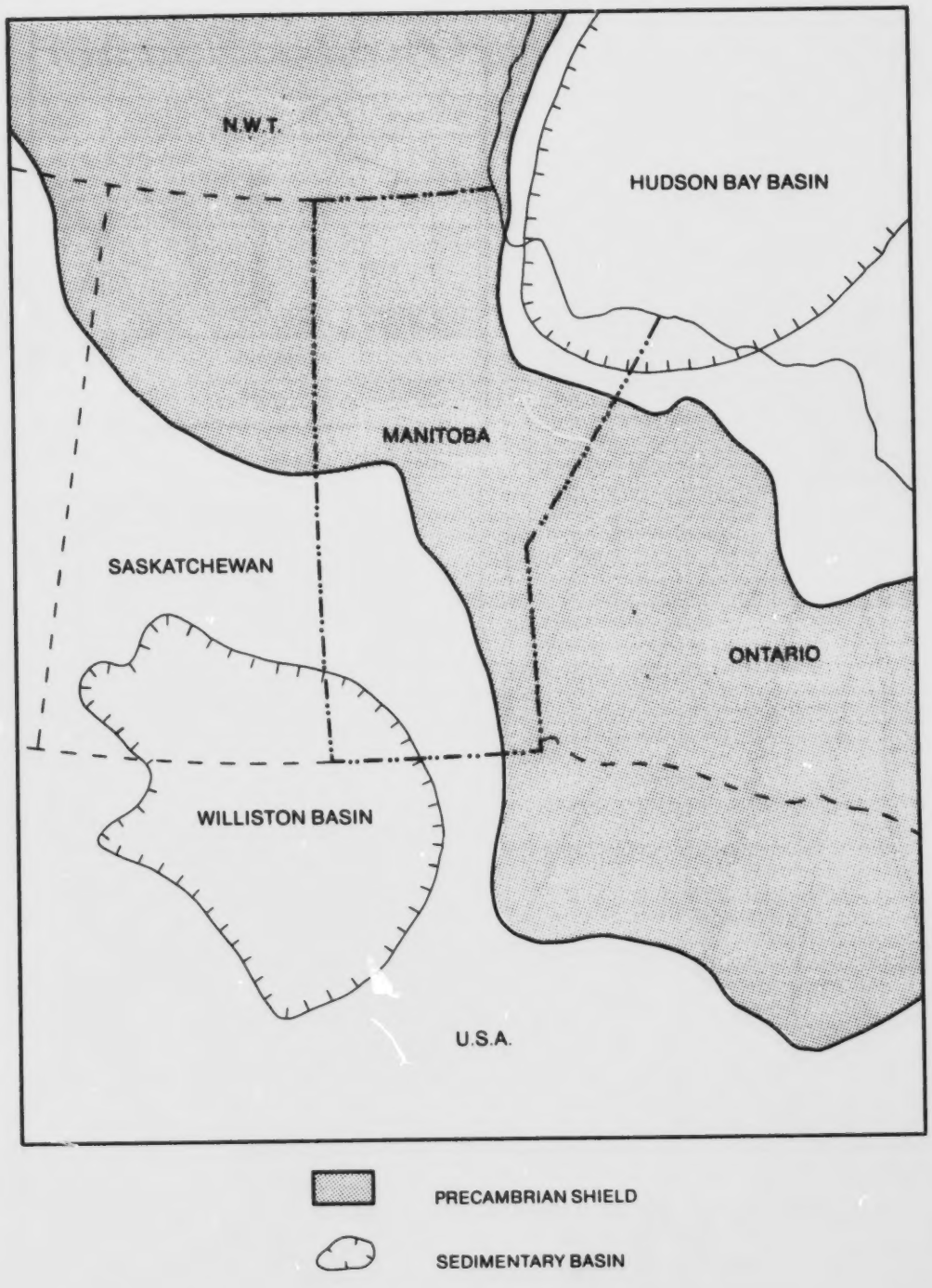


FIG. 1: WILLISTON AND HUDSON BAY BASINS

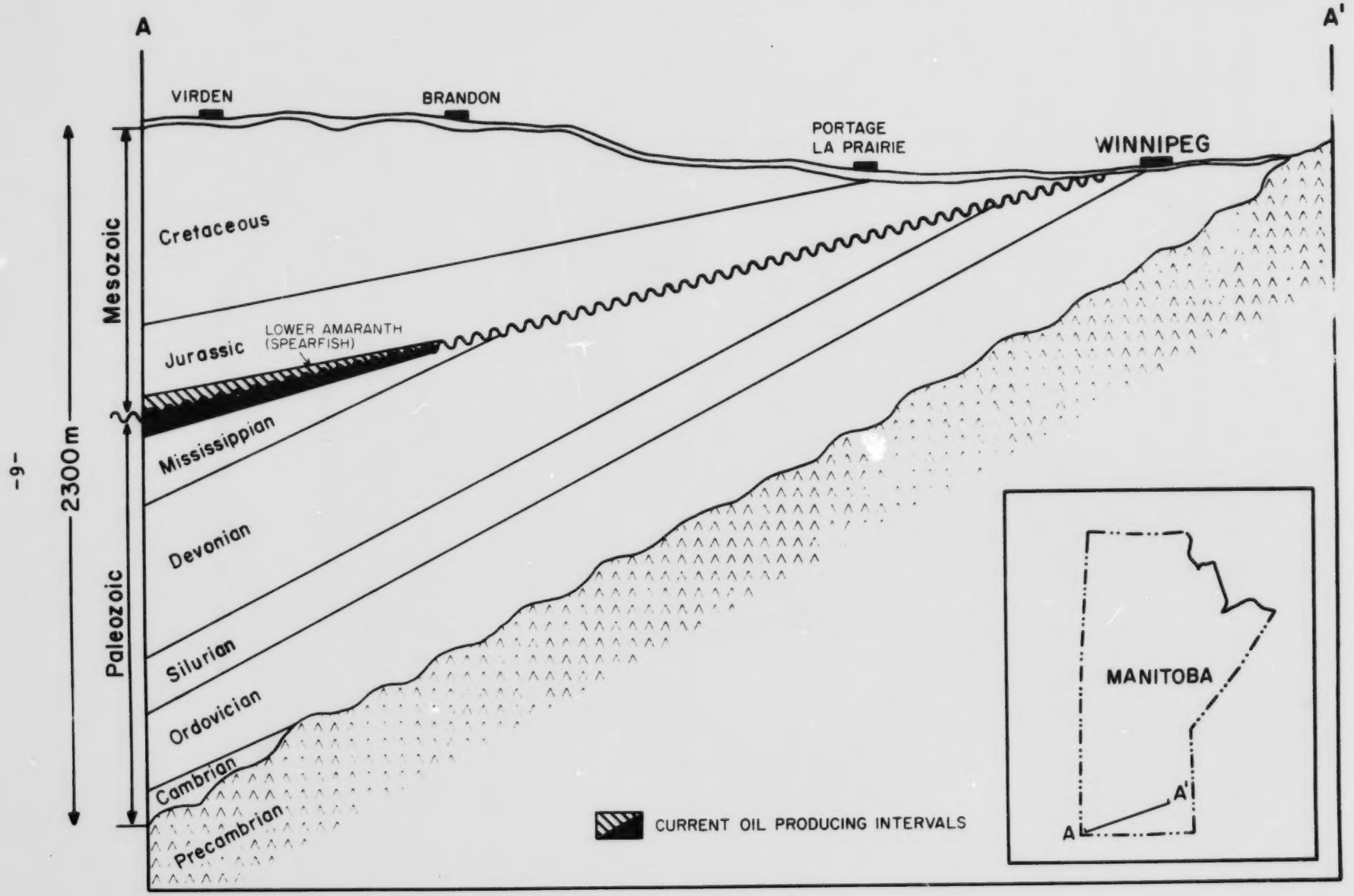
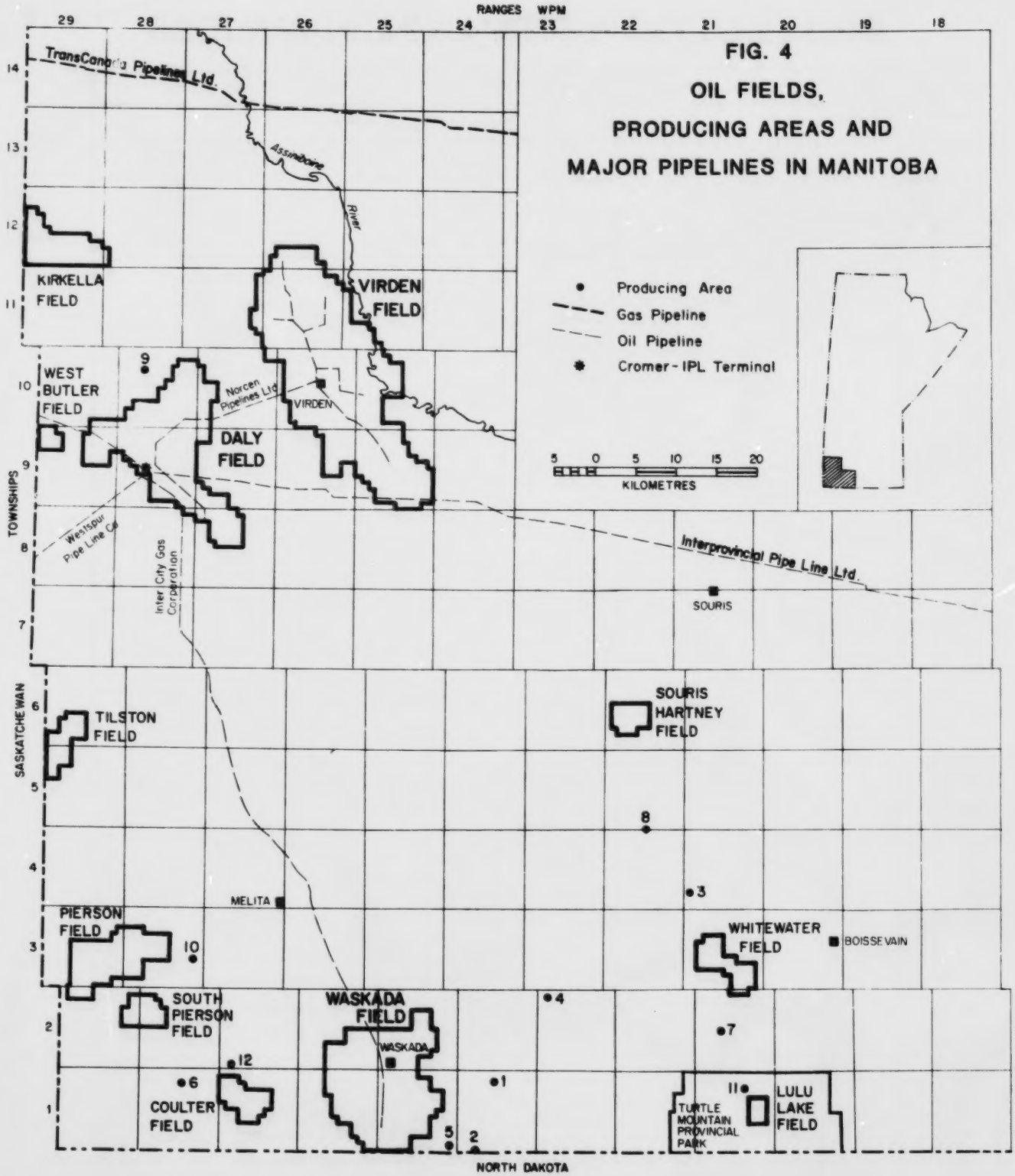


FIG. 2
CROSS SECTION – SOUTHWESTERN MANITOBA

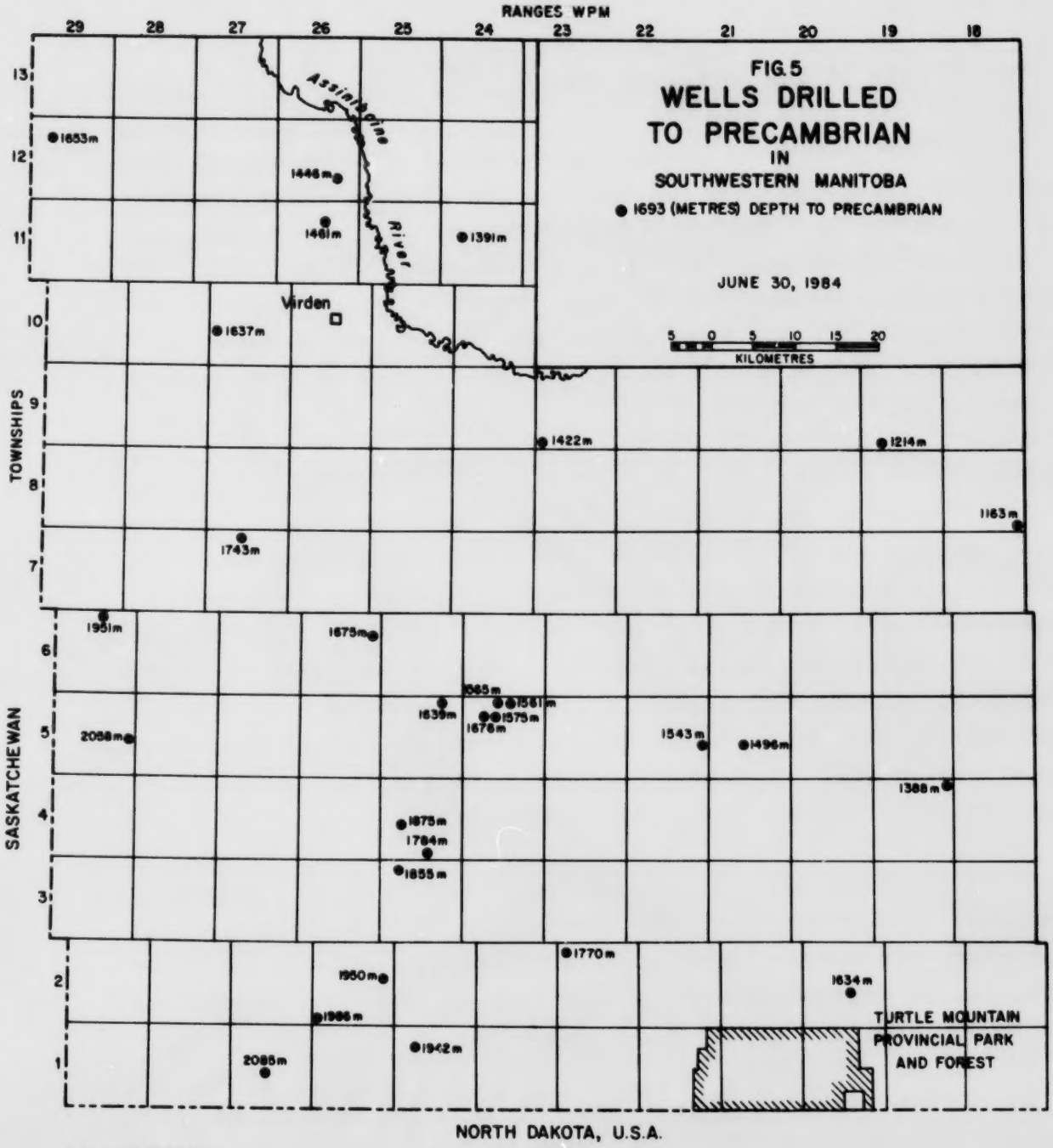
FIG.3: GEOLOGICAL FORMATIONS IN MANITOBA

ERA	PERIOD	EPOCH	FORMATION	MEMBER	MAX THICK (m)	BASIC LITHOLOGY
CENOZOIC	QUATERNARY	RECENT				TOP SOIL, DUNE SANDS
		PLEISTOCENE	GLACIAL DRIFT		140	CLAY, SAND, GRAVEL, BOULDERS, PEAT
	TERTIARY	PLIOCENE MIOCENE OLIGOCENE EOCENE				
		PALEOCENE	TURTLE MTN.	PEACE GARDEN GOODLANDS	120	SHALE, CLAY AND SAND. LIGNITE BEDS LOCATED ONLY IN TURTLE MOUNTAIN
MESOZOIC	CRETACEOUS	UPPER CRETACEOUS	BOISSEVAIN		30	SAND AND SANDSTONE, GREENISH GREY, LOCATED ONLY IN TURTLE MOUNTAIN
			RIDING MTN.	GOODLAND MORDEN	310	GREY SHALES – NON-CALC. LOCAL IRONSTONE BENTONITE NEAR BASE. GAS FOUND
			VERMILION RIVER	PEMBINA	155	SHALE DARK GREY CARBONACEOUS NON-CAL BENTONITE BANDS
				BOYNE		SHALE GREY SPECKLED CALC. BENTONITIC SLIGHTLY PETROLIFEROUS
				MORDEN		SHALE DARK GREY NON-CALC. CONCRETIONS LOCAL SAND AND SILT
			FAVEL		40	GREY SHALE WITH HEAVY CALCAREOUS SPECKS BANDS LIMESTONE AND BENTONITE
		LOWER CRETACEOUS	ASHVILLE ASHVILLE SAND		115	SHALE, DARK GREY, NON-CALC. SILTY SAND ZONE 27m F.G. QTZ. S. OR SS.
			SWAN RIVER		75	SANDSTONE AND SAND, QTZ. PYRITIC SHALE – GREY, NON-CALC.
	JURASSIC	UPPER JURASSIC	WASKADA		200	BANDED-GREEN SHALE AND CALC. SANDSTONE
			MELITA			BANDS OF LIMESTONE. VARI-COLORED SHALE
		MIDDLE JURASSIC	RESTON		45	LIMESTONE, BUFF, AND SHALES, GREY
			AMARANTH	UPPER EVAPORITE	45	WHITE ANHYDRITE AND/OR GYPSUM AND BANDED DOLOMITE AND SHALE
				LOWER RED BEDS	40	PED SHALE TO SILTSTONE-DOLOMITIC. OIL PRODUCTION
	TRIASSIC	(?)	ST. MARTIN COMPLEX		300	CARBONATE BRECCIA, TRACHYANDESITE (CRYPTO-EXPLOSION STRUCTURE)
PALEOZOIC	PERMIAN					
	PENNSYLVANIAN					
	MISSISSIPPIAN		MADISON GROUP: CHARLES		20	MASSIVE ANHYDRITE AND DOLOMITE
			MADISON GROUP: MISSION CANYON	MC – 5 MC – 4 MC – 3 MC – 2 MC – 1	120	LIMESTONE – LIGHT BUFF, OOLITIC, FOSS, FRAG., CHERTY, BANDS SHALE AND ANHYDRITE. OIL PRODUCTION
			MADISON GROUP: LODGEPOLE	FLOSSIE LAKE WHITEWATER LAKE VIRDEN SCALLION / ROUTLEDGE	185	LIMESTONE & ARG. LIMESTONE LIGHT BROWN AND REDDISH MOTTLED. ZONES OF SHALEY, OOLITIC, CRINOIDAL & CHERTY. OIL PRODUCTION
			BAKKEN	UPPER MIDDLE LOWER	20	2 BLACK SHALE ZONES – SEPARATED BY SILTSTONE. OIL SHOW HIGH R.A. KICK
	DEVONIAN		SWAN RIVER GP.: LYLETON		35	RED SILTSTONE AND SHALE DOLOMITIC
			SASK. GROUP: NISKU		40	LIMESTONE & DOLOMITE, YELLOW-GREY FOSS. POROUS, SOME ANHYD.
			SASK. GROUP: DUPEROW		170	LIMESTONE & DOLOMITE, ARG.& ANHYDRITIC IN PLACES
			MAN GROUP: SOURIS RIVER 1-ST RED		120	CYCLICAL SHALE, LIMESTONE & DOLOMITE, ANHYDRITE
			MAN GROUP: DAWSON BAY 2-ND RED		85	LIMESTONE & DOLOMITE, POROUS, ANHYDRITE – LOCAL SHALE RED & GREEN
			ELK POINT G.: PRAIRIE EVAP.		120	SALT, POTASH & ANHYDRITE, DOLOMITE INTER-BEDDED
			ELK POINT G.: WINNIPEGOSIS		75	DOLOMITE, LIGHT YELLOWISH BROWN REEFY
			ELK POINT G.: ELM POINT			LIMESTONE – FOSS, HIGH CALCIUM
			ELK POINT G.: ASHERN		12	DOLOMITE AND SHALE – BRICK RED
	SILURIAN		INTERLAKE GROUP		135	DOLOMITE YELLOWISH – ORANGE TO GREYISH – YELLOW FOSS. SILTY ZONES
	ORDOVICIAN		STONEWALL		15	DOLOSTONE, GREYISH YELLOW, BEDDED
			STONY MOUNTAIN	WILLIAMS GUNTON PENITENTIARY	30	DOLOMITE – YELLOWISH – GREY SHALEY DOLOMITE – DUSKY – YELLOW FOSS.
				GUNN	20	SHALE RED-GREEN FOSS. LIMESTONE BANDS
			RED RIVER	FORT GARRY SELKIRK CAT HEAD DOG HEAD	170	DOLOMITIC LIMESTONE, MOTTLED AND DOLOMITE
			WINNIPEG	UPPER UNIT	80	SHALE, GREEN, WAXY, SANDSTONE INTERBEDDED
				SANDSTONE		SAND, SANDSTONE, QUARTZOSE
	CAMBRIAN		DEADWOOD		80	SAND, BLACK TO GREEN-GREY WAXY, GLAUCONITIC SILTSTONE & SHALE, GREEN-GREY TO BLACK. VERY EDGE OF S.W. MANITOBA ONLY
PRECAMBRIAN						ACID & BASIC CRYSTALLINES & METAMORPHICS



OTHER PRODUCING AREAS

1. Goodlands	4. Deloraine	7. Mountainside	10. Elva
2. South Goodlands	5. South Cranmer	8. West Regent	11. Lulu Lake
3. South Regent	6. Lyleton	9. West Daly	12. Coulter



FACTS AND FIGURES ON DEEP DRILLING IN SOUTHWESTERN MANTIOBA

Area shown on the map above covers over 132 townships or 12 307 square kilometres (4,752 square miles) equivalent to 1 230 745 hectares (3,041,280 acres).

To date, only 29 wells have been drilled through the complete sedimentary section (to Precambrian) in the area shown. Most drilling in the area has been to Mississippian formations, at depths ranging between 600 m (2,000 feet) and 1 050m (3,500 feet). Oil and gas shows have been found in the deeper formations - Devonian, Silurian and Ordovician - but not in sufficient quantities to warrant their development. Current cost of drilling is estimated to vary from $100,000 to $400,000.

The 29 Precambrian wells shown represents approximately 1 well for every 5 townships (180 quare miles).

By comparison the Virden Field covers only 3 ½ townships and has already produced over 17 500 000 cubic metres (approximately 110,115,000 barrels) of crude oil.

III. Role of the Petroleum Branch

The Petroleum Branch administers provisions of The Mines Act, The Pipe Line Act and The Gas Storage and Allocation Act relating to exploration, development, production and transportation of crude oil and natural gas. In addition, the Branch lends assistance to the Department of Finance in administering The Oil and Natural Gas Tax Act and liaises with The Surface Rights Board in matters pertaining to The Surface Rights Act.

One of the major functions of the Branch is to develop, recommend, implement and administer policies and legislative changes to encourage exploration and development of the Province's crude oil and natural gas resources in an orderly, safe and efficient manner. The Branch also conducts technical studies and provides technical assistance to The Oil and Natural Gas Conservation Board in matters relating to salt water disposal, enhanced recovery projects, unitization agreements, and other Board responsibilities.

Through the collection and analysis of petroleum industry statistics, and the monitoring of federal-provincial policies, the Branch is able to evaluate the effects of these policies on the petroleum industry and to make recommendations for responsive action by senior management.

The Branch releases several reports during the year which provide the public, industry and government with information regarding the petroleum industry's performance in Manitoba.

The Branch comprises three Sections: Administration, Geology, and Engineering and Inspection. Each section has specific responsibilities relating to the overall function of the Branch.

Administration Section

The Administration Section of the Petroleum Branch administers regulations under The Mines Act governing the disposition of Crown oil and natural gas rights in Manitoba and the collection of Crown oil and natural gas royalties. These responsibilities include the holding of Crown lease and exploration reservation sales, the collection of annual rentals and enforcement of provisions under these agreements.

The Section also administers the Manitoba Drilling Incentive Program and is responsible for accumulation of monthly production and disposal/injection data on all active wells in the Province. This information is published on a monthly and annual basis.

The Section administers Manitoba's oil price supplement programs (NORP and SOOP), which are funded by the Federal Government. NORP and SOOP supplements are distributed on a monthly basis to Manitoba producers.

The oil export charge revenue-sharing program allows for the 50/50 sharing with the Federal Government of the tax on oil exports attributable to Manitoba. The Section calculates Manitoba's share of joint Manitoba/Saskatchewan streams according to agreements reached by all parties.

This Section also lends assistance to the Mining and Use Taxes Branch of the Department of Finance in the collection of taxes from producing freehold mineral rights under The Oil and Natural Gas Tax Act.

In addition to internal administrative functions, the Section also handles all financial functions of the Branch including collection of registration, licence and subscription fees and technical service charges.

Geology Section

The Geology Section evaluates all new and existing geological data and provides consultation to the petroleum industry and the general public.

Responsibilities include assistance to the Oil and Natural Gas Conservation Board in the designation and revision of new and existing field and pool boundaries, administration of the Geophysical Regulations and providing geological input to the other Sections in the Branch.

The preparation of geological reports relating to various aspects of the petroleum geology and hydrocarbon potential of Manitoba is an important function of this Section.

Engineering and Inspection Section

The Engineering component is located in Winnipeg, and administers regulations under The Mines Act relating to petroleum exploration, drilling and production operations. As part of this responsibility, the Engineering component processes drilling licence applications as well as applications

to recomplete, suspend or abandon wells. In addition, technical support is provided to The Oil and Natural Gas Conservation Board in the processing of salt water disposal, pressure maintenance, gas conservation, unitization and other major applications.

Through its technical studies dealing with oil and gas reserves and enhanced recovery potential, the Engineering component provides a consultation service and a source of information to the petroleum industry and the public.

In performing its duties pursuant to The Mines Act, the Engineering component encourages the maximum economic recovery of Manitoba's petroleum resources having regard for minimizing the impact of the environment.

Administration of The Pipe Line Act and The Gas Storage and Allocation Act are also the responsibility of the Engineering component.

The Inspection component of the Section, with district offices in Virden and Waskada, is responsible for enforcement of regulations under The Mines Act relating to geophysical, drilling, production and pipe line operations.

Staff inspect field facilities, investigate complaints, witness specific operations and interpret and communicate department or regulatory requirements to industry operating personnel.

The Inspection component also is engaged in research work to evaluate various techniques of reclaiming soil which has been contaminated by oil or salt water spills.

IV

Addresses and Telephone Listings of the Petroleum Branch, The Oil and Natural Gas Conservation Board and The Surface Rights Board

PETROLEUM BRANCH
555 - 330 Graham Avenue
Winnipeg, Manitoba R3C 4E3

Director	H. Clare Moster	945-6573
Special Projects	A. Galarnyk	945-6315
Secretary	L. Kabaluk	945-6577

ADMINISTRATION SECTION:

Petroleum Administrator	B. Thiessen	945-6571
Documents Registry	C. Herman	945-6576
Crown Royalty Reports	O. Carrothers	945-6575
Production Records	P. Seymour	945-6578
NORP Administration	S. Besth	945-3905

ENGINEERING & GEOLOGY SECTION:

Secretary	S. Beaudin	945-6314
Chief Petroleum Engineer	L.R. Dubreuil	945-6574
Petroleum Geologist	M. Rodgers	945-6572
Reservoir Engineer	M. Arbez	945-6327
Maps & Publications	D. Surzyshyn	945-8102

INSPECTION SECTION:

Virden Office: 247 Wellington Street W.
P.O.Box 1359
Virden, Manitoba ROM 2CO

District Petroleum Engineer	G.E. Johnson	748-1557
Petroleum Inspector	B. Dunning	748-1557

INSPECTION SECTION (con't)

Waskada Office:	2nd Avenue, P.O.Box 222 Waskada, Manitoba ROM 2EO	
Petroleum Inspector	K. Lowdon	673-2472
Petroleum Inspector	T. Howell	673-2472

THE OIL AND NATURAL GAS CONSERVATION BOARD: 945-6583

555 - 330 Graham Avenue
Winnipeg, Manitoba R3C 4E3

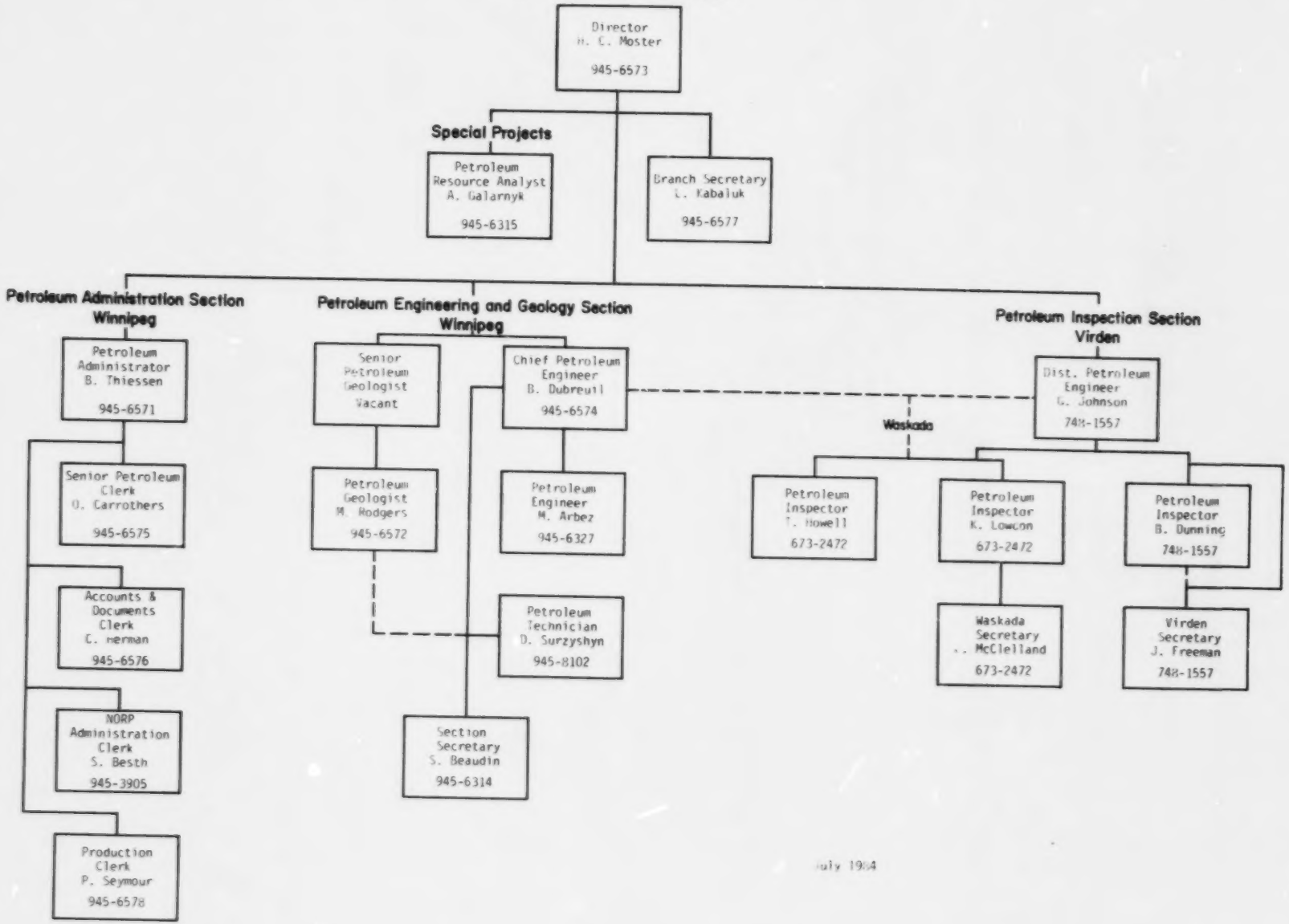
Chairman	Marc Eliesen	945-3130
Deputy Chairman	Ian Haugh	945-6583
Member	J.F. Redgwell	945-2839

THE SURFACE RIGHTS BOARD: 748-2484

258 Nelson Street P.O.Box 158
Virden, Manitoba ROM 2CO

Presiding Member	A.H. Tucker	
Deputy Presiding Member	H.N. Nixon	
Executive Director	B.T. Sheridan	748-2484

MANITOBA
ENERGY AND MINES
PETROLEUM BRANCH



July 1984

Organization Chart

V.

Petroleum Branch Inquiries

Please direct the following inquiries to:

Accounts:

Connie Herman	945-6576
Brad Thiessen	945-6571

Drilling Licensing:

Bob Dubreuil	945-6574
Marc Arbez	945-6327

Field Operation Inspections & Complaint Investigations:
(seismic, drilling, production & pipe lines)

Virden Area (N. of Twp 4)

Grady Johnson	748-1557
Bruce Dunning	748-1557

Waskada Area (Twps. 1-4)

Keith Lowdon	673-2472
Tim Howell	673-2472

Geological & Geophysical Information:

Murray Rodgers	945-6572
Dan Surzyshyn	945-8102

Geophysical (seismic) Licensing:

Murray Rodgers	945-6572
Dan Surzyshyn	945-8102

Land Sales (Crown):

Brad Thiessen	945-6571
Clare Moster	945-6573

Lease (Crown) Records:

Connie Herman	945-6576
Brad Thiessen	945-6571

Leasing (freehold):

Clare Moster	945-6573
Brad Thiessen	945-6571

Maps, Reports & Publication Requests:

Dan Surzyshyn	945-8102
Murray Rodgers	945-6572

NORP & SOOP Supplement Programs:

Sheila Besth	945-3905
Brad Thiessen	945-6571

Oil Prices:

Andy Galarnyk	945-6315
Brad Thiessen	945-6571

Pipe Lines:

Bob Dubreuil	945-6574
Andy Galarnyk	945-6315

Policy Matters (general):

Clare Moster	945-6573
Brad Thiessen	945-6571

Pooling & Unitization:

Bob Dubreuil	945-6574
Clare Moster	945-6573

Production & Injection Data (crude oil & salt water):

Paulette Seymour	945-6578
Oekie Carrothers	945-6575

Reservoir Information (engineering):

Bob Dubrieul	945-6574
Marc Arbez	945-6327

Royalty Reports (Crown):

Oekie Carrothers	945-6575
Brad Thiessen	945-6571

Surface Rights (general):

Clare Moster	945-6573
Bob Dubreuil	945-6574

Taxes, Royalties & Incentive Information (Crown & freehold)

Andy Galarnyk	945-6315
Clare Moster	945-6573

Technical Engineering Applications:

Bob Dubreuil	945-6574
Marc Arbez	945-6327

Section 2 - List of Information and Services Available

I Administrative Information

A) Acts and Regulations

1. An information binder containing all Regulations administered by the Petroleum Branch, together with a section providing information on the organization of the Department of Energy and Mines, Petroleum Branch and related Boards is available at a cost of $10.00 each. The Regulations under the Mines Act, contained in the binder are:

   a) The Crown Petroleum Leasing Regulations, 1984 (MR 148/84)
      - covering the disposition of Crown owned oil and natural gas rights in the form of leases and exploration reservations plus exploration permits for the on-shore Far North Hudson Bay region.

   b) The Petroleum Drilling and Production Regulations, 1984 (MR 147/84)
      - governing all drilling and production operations.

   c) The Crown Petroleum Royalty Regulations, 1984 (MR 149/84)
      - provides for the royalties charged on producing Crown owned oil and natural gas rights plus the Manitoba Drilling Incentive Program.

   d) The Geophysical Regulations, 1982 (MR 202/82)
      - governing geophysical (seismic) exploration operations for crude oil and natural gas.

2. The Mines Act, Chapter M160
   - legislative authority covering oil and natural gas exploration and production including unitization, pooling and Crown mineral rights tenure and royalties.

3. The Oil and Natural Gas Tax Act, Chapter 035
   - provides for a tax levied on oil and natural gas producing freehold mineral rights. The Act is administered by the Department of Finance, Mining & Use Taxes Branch.

4. The Pipe Line Act, Chapter P70
   - covers the licensing and operation of oil gathering systems (excluding flowlines between wells and batteries).

5. The Surface Rights Act, Chapter S235
   - covers right of entry and compensation for surface rights relating to petroleum exploration and development operations. The Act is administered by the Surface Rights Board.

6. The Gas Storage and Allocation Act, Chapter G52
   - covers the underground storage of natural gas.

7. The Gas Pipe Line Act, Chapter G50
   - covers natural gas transmission and distribution systems. The Act is administered by The Public Utilities Board.

Other specific regulations (i.e. - Oil and Natural Gas Conservation Board Orders relating to field and pool designations, maximum permissible production rate exemptions, special drilling spacing units, pressure maintenance, pooling and unitization) are not listed.

B. General Information Tables, Graphs and Lists

Information pertaining to the following are available upon request: (no charge unless specified)

- Crude Oil Royalties and Taxes
- Manitoba Crude Oil Qualities and Price List
- Manitoba Oil Facts
- Manitoba Petroleum Statistics Table
- Annual Lease Sale Statistics Table
- Monthly Drilling Statistics and Geophysical List (by operator).
- Selected Reservoir - Production Performance Graphs ($2.00 each).
- List of Leases in Good Standing (Geographical) (25¢ per page).
- List of Leases in Good Standing (Chronological) (25¢ per page).

II Publications and Reports

A) General Informational Publications

1. Well location Key List

   a) Geographical Order ($20.00 each)
   Publication contains a geographical listing of all Well Licences issued with corresponding well name, location and current well status.

   b) Chronological Order ($20.00 each)
   Publication contains a chronological listing of all Well Licences issued with corresponding well name, location and current well status.

2. Weekly Well Activity Report ($60.00 per calendar year subscription)

   - A weekly publication that provides latest released information on field activities (e.g., new wells licensed, drilling information, well status, name changes, wells released from confidential status, Crown Land Sale results, etc.).

3. a) Monthly Production Statistics Report ($60.00 per calendar year subscription or $5.00 per copy)

   - A monthly publication that includes monthly and cumulative oil and water production statistics by individual wells, operators, units, fields and pools, plus salt water disposal statistics by well.

b) Annual Production Statistics Report* ($10.00 per copy)

- An annual publication that includes oil and water production statistics by individual wells, operators, units, fields and pools, plus salt water disposal statistics by well.

4. Manitoba's Designated Oil Pools (no charge)

- A statistical table (metric) showing remaining recoverable reserve estimates for each producing field and pool along with average production depths, producing formations, oil density, discovery year and number of producing wells.

5. Manitoba Petroleum Royalties and Taxes (no charge)

- A general information guide relating to The Manitoba Drilling Incentive Program, Crown oil royalties, freehold oil taxes, crude oil pricing and producer netbacks.

6. Oil Activity Review (no charge)

- Prepared annually, this report presents a complete synopsis of petroleum industry activity in Manitoba during the past years.

7. Oil in Manitoba (no charge)

- A general informational publication which provides a historical look at Manitoba's

*Available for each year since 1955.

petroleum Industry up to the present time. Also discussed are Manitoba's land tenure, royalty and tax systems as well as general information on how petroleum resources are explored for and developed. (Publication currently in press - available early 1985).

8. Manitoba Petroleum Statistics (no charge)

   - A technical publication providing detailed statistical tables and graphs on Manitoba's Petroleum Industry from 1951 to the present. Included in this publication is information on wells drilled, oil production, crude oil disposition, pricing and value of production, expenditures by the industry, revenues collected by government, etc. (Publication currently in press - available early 1985).

9. Well Information Synopsis Sheets ($.50/well)

   - Contains geological, drilling and completion information on an individual well basis.

10. Previous Producing Wells - Production Information ($5.00/copy)

    - List contains all previously producing wells which have been abandoned or converted as service wells (water injection, salt water disposal etc.). Production information on the wells prior to abandonment or conversion is provided. May be a useful guide for potential re-drills, re-entries or re-evaluations.

B. Geological Publications

The following is a list of reports relating to oil and gas exploration published by the Mineral Resources Division of the Manitoba Department of Energy and Mines. These publications are available through the Petroleum Branch.

Division Publication Number	TITLE	Price
49-2	Devonian Geology of Lake Manitoba - Lake Winnipegosis Area by Andrew D. Baillie	no charge
50-1	Silurian Geology of the Interlake Area - Manitoba, by Andrew D. Baillie	no charge
51-2	Bibliography of Geology, Paleo-ontology Industrial Minerals, and Fuels in the post-Cambrian Regions of Manitoba to 1950, by Lillian B. Kerr	no charge
51-6	Ordovician Geology of Lake Winnipeg and Adjacent Areas - Manitoba, by Andrew D. Baillie	no charge
52-5	Devonian System of the Williston Basin Area, by Andrew D. Baillie	$5.00

Division Publication Number	TITLE	Price
54-2	Jurassic Stratigraphy of Manitoba, by Donald F. Stott	$5.00
57-4	Bibliography of Geology, Paleontology, Industrial Minerals, and Fuels in the Post-Cambrian Regions of Manitoba 1950-57, by B.A. Mills	no charge
58-1	Mississippian Stratigraphy of Manitoba, by H.R. McCabe	$5.00
59-6	Fauna of the Manitoba Group in Manitoba, by Helen McCammon	no charge
60-5	Mississippian Oil Fields of Southwestern Manitoba, by H.R. McCabe	$5.00
62-5	Cretaceous Bentonite Deposits of Manitoba, by B.B. Bannatyne	no charge
79-2	Geological Map of Manitoba	no charge

Division Publication Number	TITLE	Price
66-1	Bibliography of Geology, Paleontology, Industrial Minerals and Fuels in the Post-Cambrian Regions of Manitoba 1958 - 1965, by B.B. Bannatyne	no charge
67-1	The Clays and Shales of Manitoba by B.B. Bannatyne	$5.00
GP 3/70	Lake St. Martin Crypto-Explosion Crater and Geology of Surrounding Area, by H.R. McCabe & B.B. Bannatyne	no charge
ER 77-1	Summary of Available Data on Lignite Deposits - Turtle Mountain, Manitoba, by B.B. Bannatyne	$5.00
GP 78-3	Reservoir Potential of the Deadwood and Winnipeg Formations, Southwestern Manitoba, by H.R. McCabe	$5.00
Misc.Paper	Geology and Mineral Resources of Manitoba, 1962, by J.F. Davies, B.B. Bannatyne, G.S. Barry and H.R. McCabe	no charge

Division Publication Number	TITLE	Price
Misc.Paper	Reference Manual - Field Trip No. 5, Lower Paleozoic of the Interlake Area, Manitoba	$5.00
Misc.Paper	Reference Manual - Field Trip No. 6, Paleozoic and Mesozoic of the Dawson Bay Area and Manitoba Escarpment, Manitoba	$5.00
GR 78-2	Stratigraphy of the Riding Mountain, Boissevain and Turtle Mountain Formations in the Turtle Mountain Area, Manitoba, by J.D. Bamburak	$5.00
GR 82-6	Geology and Hydrocarbon Potential of the Lower Amaranth Formation in the Waskada-Pierson Area, Southwestern Manitoba, by D. Barchyn	$5.00
PR 1-85	Petroleum Geology of the MC-3 Member, Mission Canyon Formation, Pierson Field, Manitoba, by S.P. Halabura (currently in press; available early 1985)	Price to be Determined

Division Publication Number	TITLE	Price
PR 2-85	Petroleum Geology of the Mississippian Mission Canyon Formation, Waskada Field, Manitoba, by W.M. Rodgers (currently in press, available early 1985).	Price to be Determined

The following miscellaneous publications are out of print but can be reproduced at a cost of $0.25 per page.

Potash Deposits, Rock Salt and Brines in Manitoba, by B.B. Bannatyne

Evaluation of Rock Salt in Prairie Evaporite Formation, Manitoba, by B.B. Bannatyne and H.R. McCabe, Dec./66 (46 pgs.)

Tectonic Framework of Paleozoic Formations in Manitoba, by H.R. McCabe, 1966 (10 pgs.)

Excerpts from "The Geological Association of Canada, Special Paper No. 9, 1971":

- Stratigraphy of Manitoba, An Introduction and Review, by H.R. McCabe(21 pgs.)

- Ordovician and Silurian Stratigraphy of the Interlake Area, Manitoba, by J. Cowan (7 pgs.)

- Depositional Framework of the Winnipeg Formation in Manitoba and Eastern Saskatchewan, by L.W. Vigrass (10 pgs.)

- Ordovician Strata of the Hudson Bay Low-Lands in Northern Manitoba, by L.M. Cumming (9 pgs.)

- Silurian Stratigraphy of Northern Manitoba, by B.S. Norford (9 pgs.)

C Engineering and Geological Reports

The following unpublished draft reports on engineering and geological investigations of specific areas and formations within Manitoba are available from the Branch. Major reports include:

Branch Publication Number	TITLE	Price
POF 1-64	Report on the Pre-Mississippian Sedimentary Rocks of Southwestern Manitoba, 1964, by J.C. Sproule and Associates (40 pages and 52 maps and cross-sections).	$150.00
POF 2-84	Geology and Hydrocarbon Potential of the Jurassic and Cretaceous, Southwestern Manitoba by W. Morningstar, (45 pages, 7 maps, 2 cross sections).	$35.00
POF 3-84	Waskada Lower Amaranth: An overview by L.R. Dubreuil, W.M. Rodgers.	$5.00
Misc. Paper	Oil Activity in Manitoba by A.W. Galarnyk, S.P. Halabura and M. Rodgers.	No Charge

D. **Selected Bibliography** ($5.00/copy)

This bibliography lists geological and engineering reports and papers, published in various journals and bulletins all relating to oil and gas exploration in Manitoba. The purpose of this listing is to provide the explorationist with a reference to material, not provided by the Petroleum Branch, which may be of use in the evaluation of petroleum prospects in Manitoba (24 pages).

The Listing is divided into the following six sections:

1. List of publications pertaining to oil and gas exploration in Manitoba, published by the Geological Survey of Canada

2. List of publications pertaining to oil and gas exploration in Manitoba, published and available from Saskatchewan Energy and Mines.

3. List of publications pertaining to oil and gas exploration in Hudson Bay, published by the Geological Survey of Canada.

4. List of theses pertaining to oil and gas exploration in Manitoba.

5. List of publications pertaining to oil and gas exploration in the Williston Basin.

6. List of published papers on the various geological periods and geographical areas:

A. Mesozoic Era

B. Mississippian Period

C. Devonian Period

D. Precambrian - Silurian Periods

E. Williston Basin

F. North Dakota

G. Hudson Bay

E. **Technical Data Lists**

1. Lower Paleozoic Formation Tops, Bakken to Precambrian by H.R. McCabe, Dec./79 (no charge)

2. Lower Paleozoic Drill Stem Tests and Oil & Gas Shows, Bakken to Precambrian by H.R. McCabe, Dec./79 (no charge)

3. Lower Paleozoic Formation Water Analyses, Bakken to Precambrian
by H.R. McCabe, Dec./76 (no charge)

4. Index of Core and Sample Storage (1979) (no charge)

III Maps

A Stratigraphic Maps ($5.00 each)

The following is a list of maps prepared by the Mineral Resources Division detailing the stratigraphy of southern Manitoba. (most maps updated in 1980).

Map No.		Map Scale
P-1	Paleozoic Erosion Surface: structure contour-outcrop-subcrop	1" = 16 mi.
P-2	Paleozoic Erosion Surface: structure contour-subcrop, detail for Swan River area (Twps 33-38, Rges 25-29)	1" = 3 mi.
M-1	Mississippian Madison Group: isopach	1" = 4 mi.
M-2	Mississippian Erosion Surface: structure contour-subcrop	1" = 4 mi.
M-3	Mississippian: structure contour on Middle Daly ("First Crinoidal") Member, Daly Field Area	2" = 1 mi.
M-4	Mississippian: structure contour on Upper Virden ("Crinoidal") Member, Virden Area (including Virden Roselea, North Virden Scallion, Routledge, West Routledge and Maples fields)	2" = 1 mi.
DM-1	Devonian-Mississippian, Bakken & Lyleton Formations structure contour-isopach-subcrop	1" = 4 mi.

Map No.		Map Scale
DN-1	Devonian Nisku Formation: structure contour isopach-subcrop	1" = 4 mi.
DD-1	Devonian Duperow Formation: structure contour isopach-subcrop	1" = 16 mi.
DD-2	Devonian Duperow Formation: structure contour isopach-subcrop, detail for Swan River Area (Twps 33-38, Rges 25-29)	1" = 3 mi.
DSR-1	Devonian Souris River Formation: structure contour-isopach-subcrop-outcrop	1" = 16 mi.
DSR-2	Devonian Souris River Formation: structure contour-isopach-subcrop, detail for Swan River Area (Twps 33-38, Rges 25-29)	1" = 3 mi.
DDB-1	Devonian Dawson Bay Formation: structure contour-isopach-subcrop-outcrop	1" = 16 mi.
DEP-1	Devonian Elk Point Group: structure contour isopach-litho-facies-subcrop-outcrop	1" = 16 mi.
DPE-1	Devonian Prairie Evaporite Formation: structure contour-isopach-lithofacies	1" = 16 mi.
DW-1	Devonian Winnipegosis Formation: structure contour-isopach-subcrop-outcrop	1" = 16 mi.

Map No.		Map Scale
DA-1	Devonian Ashern Formation: structure contour-isopach-outcrop	1" = 16 mi.
SI-1	Silurian Interlake Group: structure contour isopach-subcrop-outcrop	1" = 16 mi.
OS-1	Ordovician Stonewall Formation: structure contour-isopach-subcrop-outcrop	1" = 16 mi.
OSM-1	Ordovician Stony Mountain Formation: structure contour-isopach-subcrop-outcrop	1" = 16 mi.
ORR-1	Ordovician Red River Formation: structure contour-isopach-subcrop-outcrop	1" = 16 mi.
OW-1	Ordovician Winnipeg Formation: structure contour-isopach-subcrop-outcrop	1" = 16 mi.
PC-1	Precambrian: structure contour - depth to Precambrian	1" = 16 mi.
KB-TTM-1	Upper Cretaceous(?) Boissevain Formation: structure contour-isopach-outcrop; and Tertiary Turtle Mountain Formation: isopach-outcrop	1" = 2 mi.
K2M-2	Riding Mountain Formation: Odanah Member structure contour-isopach-outcrop	1" = 8 mi.

Map No.		Map Scale
KRM-1	Riding Mountain Formation: Millwood Member structure contour-isopach-outcrop	1" = 8 mi.
KV-2	Vermilion River Formation: Top of Boyne Member to base of Pembina Member cross-section; structure contour-isopach-outcrop	1" = 8 mi.
KVM-1	Vermilion River Formation: Morden Member structure contour-isopach-outcrop	1" = 8 mi.
KF-1	Favel Formation: structure contour-isopach-outcrop	1" = 8 mi.
KA-2	Upper Ashville: to base of fish scale zone structure contour-isopach-outcrop	1" = 8 mi.
KA-1	Lower Ashville: from base of fish scale zone: structure contour-isopach-outcrop	1" = 8 mi.
KA-14	Structure contour and isopach map of sand zone, Ashville Formation	1" = 8 mi.

Stratigraphic Cross-Section Series:

Px-1	Eight-well east-west stratigraphic cross-section, southwestern Manitoba (1954)
Px-2	Seven-well north-south stratigraphic cross-section, southwestern Manitoba (1954)
Px-3	Nine-well north-south stratigraphic cross-section, southwestern Manitoba (1954)

Px-5 Six-well east-West stratigraphic cross-section of Mississippian, Sinclair to Oak Lake (1954)

Px-6 Seven-well east-west stratigraphic cross-section of Mississippisan Pierson to Boissevain (1954)

B. Well Location Maps ($10.00 each or set of 7 for $50.00)

1. Map No. 1:

This map comprises the southern half of the Province (includes Twps 1-46, Rges 17E-29 WPM) on a scale of 1:500 000. The map shows producing oil fields, major pipelines, forest reserves, parks and well locations outside the area covered by Map No. 7.

2. Map Nos. 2-6

Each of these maps covers a specific area in the southwest corner of the province where exploration activity has been most concentrated. The scale is 1:50 000. The maps show field boundaries, wells drilled and their present status. The areas covered by each of these maps are as follows:

Map No. 2:	Twps 11-13,	Rges 25-29 WPM
Map No. 3:	Twps 6-10,	Rges 25-29 WPM
Map No. 4:	Twps 1-5,	Rges 25-29 WPM
Map No. 5:	Twps 1-5,	Rges 20-24 WPM
Map No. 6:	Twps 6-10,	Rges 20-24 WPM

3. Map No. 7

This is a well location map of the southwestern corner of the Province showing wells drilled and their present status, and includes field boundaries. The scale is 1:125 000 and covers Twps 1-18, Rges 19-29 WPM.

Note: All well location maps are updated bi-annually.

C. Crown Oil and Natural Gas Rights Maps ($10.00 each)

This map, at a scale of 1:125 000, shows all Crown oil and natural gas rights and the current status of all parcels. Includes Twps 1-18, Rges 19-29 WPM (available early 1985).

D. Pool Location Map ($10.00 each)

This map, at a scale of 1:125 000, shows the location and boundaries of all currently designated pools, the geological zone from which each pool produces, pool names, assigned Field/Pool codes and well locations. Twps 1-12, Rges 19-29 WPM.

E. Selected Township Maps ($5.00 each)

These maps at a scale of 1:20 000 each cover one complete township and show all well locations and their current status. Ideal for use in engineering and geological studies and reports.

F. Petroleum Branch Informational Map (No Charge)

This map at a scale of 1"=10 kilometres (Twps. 16-29, Rges. 1-18) shows the location of municipal boundaries, highways district boundaries and major underground pipe lines.

IV. Geological and Geophysical Data

The following is a list of non-confidential geological and geophysical data available for examination at the office of the Petroleum Branch, 555 - 330 Graham Avenue, Winnipeg.

The list has been divided into 7 separate sections:

A. Geological data (from structure test holes, core holes and wells) submitted under Geophysical Licences and Reservations of Oil and Natural Gas Rights.

B. Seismic data submitted under Geophysical Licences and Reservations of Oil and Natural Gas Rights.

C. Other geophysical data (magnetic, gravity, radiation) submitted under Geophysical Licences, Reservations of Oil and Natural Gas Rights and Permits.

D. Information and data submitted under Exploratory Permits for the Far North Hudson Bay Lowlands area.

E. Information submitted pertaining to Oil Shale Exploration under Oil Shale Reservations and Special Projects.

F. Information and data pertaining to Helium Exploration submitted under Helium Reservations, Special Reservations and Geophysical Licences.

G. Reports on Velocity Surveys.

On request, and whenever possible, this data will be made available for the cost of reproduction:

1.	Maps:	$5.00/copy
2.	Reports:	$0.25/xerox page

A. GEOLOGICAL DATA (STRUCTURE TEST HOLES, CORE HOLES, WELLS)

Geological and Geophysical Licences:

Lic. No. 1 — California Standard - 1947

Southwestern Manitoba — Twps 1-12, Rges 14-29 WPM
Twps 13-18, Rges 22-29 WPM

A. Final geological report

B. Structure test holes - Wawanesa Area Twps 7,8; Rge 17
- Souris River Area Twps 1-13, Rges. 10-18

1. Report

2. E Logs and S.T.H. Location Maps

Lic. No. 10 — Imperial Oil - 1950

Riding Mountain and Duck Mountain Areas — Twps 17-21, Rges 19-29 WPM
Twps 21-30, Rges 26-29 WPM

A. Final technical report and a drilling report for 4 wells:

Imperial Birtle 1-27-17-26
Imperial Madeline Prov. 16-18-18-29
Imperial Foxwarren Prov. 16-32-19-27
Imperial Bluewing Lake Prov. 13A-4-24-27

Lic. No. 15 — Red-Man Oils - 1950

Russell, Rossburn — Twps 19-22, Rges 24-29 WPM

A. Geological report on structure test holes

1. S.T.H. Location Map

2. Structure Contour Map - Top of "First Specks"

3. E. Logs

Lic. No. 20 — Shell Oil - 1951

Swan River Area — Twps 34-38, Rges 25-29 WPM

A. Geological report, plus:

1. Geological Report

   - S.T.H. #1 (NE 36-36-25)
   - S.T.H. #3 (NW 31-36-26)

2. Geological Report - 2 wells:

   Shell Swan River Prov. 13-3-35-29
   Shell Swan River 9-1-37-28

3. Structure Test Holes - Location Map (97 holes) - showing "useful substances" (sand, gravel, coal, water)

4. Film of electric logs for 97 structure test holes, and Riley copies 1" = 40'.

Lic. No. 22 — British American Oil - 1951

Grandview, Gilbert Plains — Twps 23-27, Rges 21-23 WPM

A. Geological report

B. Sample Description for the following wells:

   B.A. Gilbert Plains Prov. 16-18-24-21
   B.A. Grandview Prov. 16-30-24-23
   B.A. Grandview Prov. 16-15-25-25
   B.A. Grandview Prov. 13-24-26-23

Lic. No. 26 — Canadian Devonian - 1952

Spruce Woods — Twps 8, 9, Rges 11, 12 WPM
Duck Mountain, Benito — Twps 30-34, Rges 27-30 WPM

A. Photogeological report with structure cross-sections

B. Geological report

1. Structure Test Hole Locations
2. Surface Geology Maps
3. E-Logs

Lic. No. 26 Con't

C. Applications to drill and abandon, location plats, and daily drilling report for structure test hole locations.

Lic. No. 34 — West Plains - Sweet Grass - 1953

Neepawa — Twps 11-18, Rges 14-17 WPM

A. Geological report on reservation with cross-section of SW Manitoba.

B. Maps
   1. Structure Contours
      a. Top Favel
      b. Top Winnipegosis
      c. Top Precambrian

   2. Isopach

      a. Top Favel -Precambrian
      b. Ground Level - Precambrian
      c. Paleozoic - Winnipegosis

   3. Paleogeologic map of the Paleozoic surface.

C. Photogeological Mosaics - 12 sheets, Neepawa Area.

D. Geological report on structure test holes.

E. Structure test hole locations.

Lic. No. 51 — California Standard - 1955

Roblin Area — Twps 23-26, Rges 24-28 WPM

A. Geological and drilling

   1. One well - Mill Creek East Bluewing Lake 1-11-24-26

      a. Logs
      b. Core and samples

Lic. No. 53 — Great Sweet Grass - 1955

Duck Mountain — Twps 27-35, Rges 23-27 WPM

A. Preliminary geological report

1. Photogeological Mosaics: (9 sheets) Twps 26-36,Rges 22-28
2. Surface Geology and Structure Contour Map of the Favel Formation.

B. Report on lease selections & maps

1. Structure Maps:

   a. Contours on Top of Favel Formation
   b. Contours on Top of Paleozoic
   c. Contours on Top of Winnipeg Formation

2. Isopach Maps:

   a. Isopach map of interval from Top of Paleozoic to Top of Winnipegosis.
   b. Isopach map of interval from Top of Favel to Top of Paleozoic.

3. NW - SE Cross-section

C. Structure Test Holes

1. Locations
2. Geological Report
3. E-Logs

D. Geological Report

1. Structure
   a. Contours on Top of Favel Formation
   b. Contours on Top of Paleozoic
   c. Contours on Top of Winnipeg Formation

2. Isopach Maps:
   a. Isopach map of interval from Top of Paleozoic to Top of Winnipegosis.
   b. Isopach map of interval from Top of Favel to Top of Paleozoic.

Lic. No. 54 — Canadian Oil & Gas - 1955

Swan River Area — Twp 34, Rge 27 WPM

A. Geological report

B. Preliminary report - Oil and Gas Prospects Structure Contour Map - Top of Favel, Twps 33-36, Rges 25-29.

Lic. No. 63 — Canadian Devonian - 1956

Morden Area — Twp 1, Rges 5 -7 WPM

A. Exploration and geological report

1. Map: Structure Contour, Second Specks (Favel)
2. Structure Test Hole Locations
3. E-Logs

Lic. No. 73* — Sun Oil Co. - 1957

S.E. Manitoba — Twps 5 - 10, Rges 5E-3 WPM

A. Geological report on Southern Manitoba.

1. Core Hole Locations - 10 holes.
2. Final progress report

B. Maps:

1. Structure Contour - Top of Precambrian
2. Isopach: Upper Winnipeg Sand Twps 1-14, Rges 7E-11W, Twps 1-11, Rges 11-15W

*Interpretation is added to maps under Lic. 73.

Lic. No. 75 — California Standard - 1958

Woodlands Area — Twps 14-17, Rges 1-2 WPM
Twps 17-19, Rges 2-3 WPM

A. Preliminary geological report.

Lic. No. 75 Con't

B. Logs, samples and core from the following well: Calstan Woodlands Prov. 4-6-15-2 WPM

C. Final geological completion report.

Lic. No. 76 — Shell Oil - 1958

Gregg Area

Twps 10-14, Rges 13-17 WPM
Twps 11-19, Rges 18-20 WPM
Twps 15-19, Rges 21-22 WPM

A. Preliminary geological report.

B. Summary Report.

C. Final geological report

D. Maps:

1. Core hole locations

2. Structure contours on -
   a. Top Favel Formation
   b. Top Spearfish Formation
   c. Top Paleozoic Formation
   d. Top Souris River Formation

3. Isopach contours of -
   a. Paleozoic
   b. Duperow

E. Cross-section.

F. 14 Core Holes - Devonian Tests

1. Logs
2. Samples

Lic. No. 77 — Sun Oil Co. - 1958

S.E. Manitoba

Twps 9-12, Rges 2E-2 WPM

A. Geological and drilling

1. Maps:

Lic. No. 77 Con't

a. Structure Contour - Top of Precambrian
b. Isopach Upper Winnipeg Sand.

Lic. No. 86 — California Standard - 1961

Birdtail Area — Twps 15-18, Rges 27-28 WPM
Twps 17-18, Rges 29 WPM

A. Exploration report
B. Geological report

Reston Area — Twps 5, Rges 27-28 WPM
Twps 7, Rges 27-28 WPM

A. General geological report
B. Final completion and geological report for 7-35-6-28

Russell Area — Twps 20-21, Rge 29 WPM

A. General geological report
B. Logs, samples and core for: Calstan Endcliffe 9-9-21-27
C. Final completion and geologicl report for the well.

Lic. No. 102 — Atlantic Refining - 1965

Treherne Area — Twps 5-8, Rges 6-12 WPM

(Oil Shale Reservation 11, 12, 13)

Lic. No. 107 — Phoenix Canada Oil - 1965

Carman Area — Twps 5-7, Rges 3-6 WPM

A. Preliminary geological report.

B. Maps and Cross-sections

1. Correlation cross-section generalized
2. Structure contours, Paleozoic unconformity
3. Structure cross-sections A-A, B-B, C-C.

Lic. No. 115* — Greater Winnipeg Gas Co. - 1968

Carman Area — Twps 7-12, Rges 1-4 WPM

I Structure test hole program

A. Geological report including:

1. A map showing the loation of the correlation holes drilled together with the structure of the Gunton Formation.

2. A cross-section showing the structural markers used in mapping.

3. A short report of work done.

B. Tour reports.

C. Location plates.

D. Progress reports.

E. 5 electric logs for the structure test holes.

*Maps and interpretation is added to Lic. No. 115

Lic. No. 118 — Sinclair Canada Oil - 1968

Riding Mountain Area — Twps 18-19, Rges 17-18 WPM
Twps 19-22, Rges 15-16 WPM

A. Preliminary geological report.

B. Preliminary maps and cross-sections
1. Structure contour maps, top Winnipeg Sandstone.
2. Isopach map, net thickness, upper end sand member Winnipeg Formation
3. Index map, extent upper sandstone member, Winnipeg Formation
4. Stratigraphic cross-section, A-A, Winnipeg.
5. Stratigraphic cross-section, B-B, Winnipeg.

C. Final geological report.

D. Final Maps
1. Structure on Precambrian
2. Isopach of upper sand member, Winnipeg Formation
3. Stratigraphic cross-section, A-A, Winnipeg Formation
4. Stratigraphic cross-section, B-B, Winnipeg Formation

Lic. No.122 — Greater Winnipeg Gas Co. - 1969

Carman Area — Twps 3-11, Rges 1-4 WPM

I Structure test hole program

Lic. No. 129 — Husky Oil Limited - 1970

Dawson Bay Area — Twps 44-46, Rges 24-28 WPM

A. Geological report and summary of exploration.

Geological and Geophysical Reservations:

Res. No. 57 — British American Oil - 1956

Lavenham Area — Twps 9, 14, Rges 7-13 WPM

A. Preliminary geological report

B. Geological completion report for one well.

Res. No. 58 — Amerada Petro Corp. - 1956

Spruce Woods Area — Twps 8-10, Rges 14-16 WPM

A. Geological report

B. Geological completion report for one well.

Res No. 59 — British American Oil - 1957

Neepawa Area — Twps 15-18, Rges 12-13 WPM
Twps 16-18, Rge 14 WPM
Twps 17-18, Rge 15 WPM

A. Preliminary geologicalreport

B. Geological completion report for one well.

Res. No. 72 — British American Oil - 1961

S.W. Manitoba — Twps 1 & 2, Rge 23 WPM
Twps 2-4, Rge 24 WPM

A. General geological report.

Res. No. 105 — Shell Oil - 1968

Dauphin Lake Area — Twps 22-26, Rges 15-18 WPM

A. Preliminary geological report

B. Final technical report

1. Structure contour - isopach map, Winnipegosis Formation, Twps 11-31, Rges 4-28 WPM

2. Structure contour - top Winnipeg Formation with Isopach upper sand member and stratigraphic cross-section (1" = 3 mi.), Twps12-29, Rges 11-25 W.

Res. No. 115 — Asamera Oil Corporation - 1971

Plum Area — Twps 1-3, Rges 1E-3 WPM
Twp 4, Rges 1E-1 WPM

A. Geological and geophysical investigation report.

Res. No. 116 — Asamera Oil Corporation - 1971

Sifton Area — Twps 24-28, Rge 20 WPM
Twps 28, Rge 21 WPM

A. Geological and geophysical investigation report.

B) SEISMIC DATA

Geological and Geophysical Licences:

Lic. No. 1 — California Standard - 1947

S.W. Manitoba — Twps 1-18, Rges 14-29 WPM

A. Seismic report

B. Maps:

Pelican Lake Area — Twps 1-6, Rges 14-21

1. Shot point locations, elevations & lithologs

2. Seismic structure contour maps:
   a. Favel
   b. Mississippian
   c. Devonian
   d. Winnipeg Shale

3. Seismic Isochron maps:
   a. Favel - Mississippian
   b. Favel - Top of Devonian
   c. Favel - Winnipeg Shale
   d. Mississippian - Devonian
   e. Devonian - Winnipeg Shale

4. Shot hole lithology plotted on map.

Turtle Mountain Area — Twps 1-6, Rges 22-29

1. Shot point locations, elevations & lithologs

2. Seismic structure contour maps
   a. Favel
   b. Mississippian
   c. Devonian
   d. Winnipeg Shale

3. Seismic Isochron maps:
   a. Favel - Mississippian
   b. Favel - Top of Devonian
   c. Mississippian - Devonian
   d. Devonian - Winnipeg Shale

4. Shot hole lithology plotted on map

Brandon Area — Twps 7-10, Rges 20-21

1. Shot point location, elevations & lithologs

2. Seismic structure contour maps:
   a. Devonian

3. Shot hole lithology plotted on map

Virden Area — Twps 7-12, Rges 22-29

1. Shot point locations, elevations & lithologs

2. Seismic structure contour maps
   a. Favel
   b. Mississippian
   c. Bakken
   d. Winnipeg Shale

3. Seismic Isochron maps:
   a. Favel - Bakken
   b. Favel - Winnipeg Shale
   c. Mississippian - Bakken
   d. Bakken - Winnipeg Shale

4. Shot hole lithology plotted on map.

Shoal Lake Area — Twps 13-18, Rges 22-29

1. Shot point locations, elevations & lithologs

2. Seismic Structure Contour maps:
   a. Favel
   b. Paleozoic & Jurassic
   c. Middle Devonian
   d. Winnipeg Shale

3. Seismic Isochron maps:
   a. Favel - Paleozoic & Jurassic
   b. Favel - Winnipeg Shale
   c. Middle Devonian - Winnipeg Shale

4. Shot hole lithology plotted on map.

Lic. No. 10 — Imperial Oil - 1950

Riding Mountain — Twps 17-20, Rges 18-25 WPM
Duck Mountain Areas — Twps 17-30, Rges 26-29 WPM

A. Final technical report including maps:

1. Shot point locations & elevations
2. Contours on approximate Top of Paleozoic

B. Shot hole lithologic logs.

Lic. No. 12 — Souris Valley - 1950

Lyleton Area — Twps 1-2, Rges 26-29 WPM

A. Seismic report, including structure contour maps on:

1. Cretaceous
2. Lower Cretaceous
3. Triassic?
4. Upper Devonian
5. Basal Devonian

B. Seismic interpretation cross-sections.

Lic. No. 14 — Shell Oil - 1950

Swan River Area — Twps 34-38, Rges 25-29 WPM

A. Map of shot hole locations & elevations one month only due to lack of energy in area.

Lic. No. 41 — Imperial Oil - 1953

Southwest Manitoba — Twps 1-11, Rges 19-29 WPM

A. Seismic shot point location & elevation map.

B. Shot hole lithologs

C. Structure contour maps on:

1. Pierson Area, Twps 1-6, Rges 27-29
   a. Second White Specks
   b. Devonian
   c. Winnipeg

Lic. No. 41 Cont'd.

2. Lauder Area, Twps 1-6, Rges 20-27
   a. Second White Specks
   b. Devonian
   c. Winnipeg

3. Daly Area, Twps 6-11, Rges 27-29
   a. Second White Specks
   b. Devonian
   c. Winnipeg

4. Virden Area, Twps 6-11, Rges 20-27
   a. Second White Specks
   b. Watrous
   c. Winnipeg

Lic. No. 44 — Socony Oil - 1954

Virden Area — Twps 9-10, Rges 24-25 WPM

A. Report on experimental seismic work.

B. Maps:

1. Structure contour on top of:
   a. Blairmore
   b. Nisku

2. Shot point locations, elevations & surficial deposits

Lic. No. 45* — Texaco Exploration Co. - 1954

S.W. Manitoba — Twps 1-5, Rges 23-29 WPM

Pierson Project: Twps 3-4, Rges 26-29

A. Final geological report

B. Maps:
1. Structure contour maps
   a. Surface topography
   b. Cretaceous
   c. Jurassic
   d. Mississippian
   e. Devonian

Lic. No. 45* Cont'd

2. Time contour maps:
   a. Cretaceous - Mississippian
   b. Cretaceous - Devonian
   c. Mississippian - Devonian

C. Shot point locations & elevations

D. Shot hole lithologs

Coulter Project: Twp 1, Rges 26-27

A. Final geological report

B. Maps:
   1. Structure contour maps:
      a. Surface topography
      b. Cretaceous
      c. Jurassic
      d. Mississippian
      e. Devonian

   2. Time contour maps:
      a. Cretaceous - Mississippian
      b. Cretaceous - Devonian
      c. Mississippian - Devonian

C. Shot point locations & elevations

D. Shot hole lithologs

Deloraine Project: Twps 1-5, Rges 23-27

A. Final geological report

B. Maps:
   1. Structure contour maps:
      a. Surface topography
      b. Cretaceous
      c. Jurassic
      d. Mississippian
      e. Devonian

   2. Time contour maps:
      a. Cretaceous - Devonian
      b. Mississippian - Devonian

Lic. No. 45* Cont'd

C. Shot point locations & elevations

D. Shot hole litholog

*Interpretation is added to maps of License No. 45.

Lic. No. 51* — California Standard - 1955

Russell Area — Twps 19-24, Rges 25-29 WPM
Shevlin Area — Twp 25, Rges 25-29 WPM

A. Report on exploration: geological and geophysical

B. Maps:
1. Structure contour maps:
   a. Favel
   b. Paleozoic & Jurassic
   c. Middle Devonian
   d. Winnipeg Shale

2. Isochron Maps:
   a. Favel-top Paleozoic & Jurassic
   b. Favel - Winnipeg Shale
   c. Middle Devonian - Winnipeg Shale

3. Map of shot hole location and elevations
4. Map showing surficial deposits

C. Shot hole lithologic logs.

*Interpretation is added to maps of License No. 51.

Lic. No. 56 — Amerada Petr. Corp. - 1955

Lauder - Oak Lake Area — Twp 1, Rge 20 WPM
Twps 5-8, Rges 24-26 WPM

A. Shot point location plats.
B. Map: proposed grid for seismic survey.

Lic. No. 57 — Canadian Gulf - 1956

Butler Area — Twps 9-10, Rges 28-29 WPM

A. Shot hole location map and elevations
B. Lithologic logs
C. Seismic countour map on intermediate horizon-Lodgepole.

Lic. No. 61 — Tidewater - 1956

Butler Area — Twps 9-10, Rges 29 WPM

A. Report on seismic surveys

B. Maps:
   1. Structure contour:
      a. Top of Second Specks
      b. Top of Mississippian
   2. Shot point locations & elevations

C. Lithologic logs.

Lic. No. 62 — Texaco Exploration Co. - 1956

Melita Area — Twps 1-5, Rges 23-25 WPM

Waskada Project - Twps 1, 2, Rges 23-25
Lauder Project - Twps 3-5, Rges 23-25

For each project:
A. Technical report
B. Map of shot hole location and elevation
C. Shot hole litholog

Lic. No. 64 — Imperial Oil - 1956

Hamiota Area — Twps 13-15, Rges 24-26 WPM

A. Final technical report
B. Maps:
   1. Structure contour Top Devonian or near Top Paleozoic
   2. Shot point locations & numbers
   3. Shot point elevations

Lic. No. 67 — British American Oil - 1956

North Virden Area — Twps 10-12, Rges 26-27 WPM

A. Shot hole locations & elevations
B. Maps:
   Structure contours on intermediate horizons Lodgepole
C. Shot hole lithologic logs
D. Report of operations

Lic. No. 70 — California Standard - 1957

Russell Area — Twps 21, Rges 27-28 WPM
Hartney Area — Twp 5, Rge 24 WPM

A. Shot hole locations and surficial deposits - both areas

B. Lithologic logs

C. Summary report - Russell Area

Lic. No. 71 — Shell Oil - 1957

Hartney Area — Twps 5-6, Rges 20-21 WPM

A. Summary report of the regional geology

B. Maps:
1. Structure contour - Jurassic (J) (Twps 5-6, Rges 24)
2. Structure contour - Devonian Nisku (Twps 5-6, Rges 20-21)

Lic. No. 76 — Shell Oil - 1958

Gregg Area — Twps 17-19. Rges 19-21 WPM
Findlay Area — Twps 5-9, Rges 21-26 WPM

A. Summarized geological reports, Gregg Area and Findlay Area

B. Maps:
1. Seismic contour maps, Jurassic JP5, Gregg area
2. Seismic contour map, Devonian near top of Nisku, Findlay Area
3. Shot hole locations & elevations

C. Shot hole lithologic logs

Lic. No. 79 — British American Oil - 1959

Melita Area — Twps 2-5, Rges 26-29 WPM

A. Seismic Report

B. Maps:

Lic. No. 79 Cont'd

1. Structure Contour:
   a. Second White Specks
   b. Mississippian
   c. Devonian
2. Isochron map: Prairie Evaporite - Winnipeg

Lic. No. 81 — Shell Oil - 1960

West Hartney Area — Twps 5,6, Rges 23-25 WPM

A. Seismic summary report

B. Map showing shot hole locations, surface elevations, and surficial deposits.

C. Maps:
   1. Structure contour:
      a. Second White Specks
      b. Winnipeg

   2. Isopach maps:
      a. Second White Specks - Winnipeg

Lic. No. 82 — Texaco Exploration Co. - 1960

Hartney Area — Twps 5-6, Rges 23-25 WPM

A. Technical Report

B. Maps:
   1. Structure contour maps:
      a. Second White Specks
      b. Paleozoic Unconformity
      c. Devonian

C. Shot point elevations, topography

D. Drift map - (drill hole lithology)

Lic. No. 87 — Texaco Exploration - 1961

S.W. Manitoba

Turtle Mountain Project: Twps 2-3, Rges 22 and Twp 3, Rge 23 WPM

A. Technical report

B. Maps:
   1. Structure contours
      a. Topography
      b. Second White Specks
      c. Mississippian
      d. Devonian
      e. Ordovician

   2. Isopach maps:
      a. Second White Specks - Mississippian
      b. Mississippian - Devonian
      c. Devonian - Ordovician

   3. Topographic maps - shot hole locations & elevations.

C. Drillers logs

Tilston Project: Twps 4-6, Rges 28-29

A. Technical report

B. Maps:
   1. Structure contours:
      a. Topography
      b. Second White Specks
      c. Regional Second White Specks
      d. Mississippian
      e. Devonian
      f. Precambrian

   2. Isopach maps:
      a. Second White Specks
      b. Mississippian - Devonian
      c. Devonian - Precambrian

   3. Topographic map - shot hole locations & elevations

C. Drillers logs.

Lic. No. 87 Cont'd.

Peacock Project: Twp 5, Rges 26-27

A. Technical Report

B. Maps:
1. Structure contours:
   a. Topography
   b. Second White Specks
   c. Mississippian
   d. Devonian
   e. Precambrian

2. Isopach maps:
   a. Second White Specks - Mississippian
   b. Mississippian - Devonian
   c. Devonian - Precambrian
   d. Project report

3. Topographic maps - shot hole location & elevation

C. Drillers logs.

Lic. No. 89 Shell Oil - 1961

Tilston Area Twps 5-6, Rge. 29 WPM

A. Seismic - summary report

B. Map showing shot hole locations, elevation & surficial materials.

No available interpretive maps because of poor quality seismic data.

Lic. No. 91 British American Oil - 1961

Melita - Tilston Area Twp 4, Rges 25-27 WPM
Twp 5, Rges 26-27 WPM
Twp 6, Rges 26-29 WPM

A. Summary report

B. Maps:

Lic. No. 91 Cont'd.

1. Structure contours:
   a. Mississippian
   b. Devonian

2. Isopach maps:
   a. Prairie Evaporite - Winnipeg

3. Seismic shot point location & elevation map.

C. Shot hole lithologs

Lic. No. 95 — Mobil Oil of Canada - 1963

North Antler Area — Twps 7, 8, Rge. 29 WPM

A. Seismic report

B. Maps:
   1. Time contour maps:
      a. Top of Colorado
      b. Top of Watrous
      c. Top of Paleozoic Unconformity
      d. Top of Bakken
      e. Top of Winnipeg

   2. Time interval contour map:
      a. Top of Paleozoic Unconformity - Top of Bakken

   3. Depth contour maps:
      a. Structure contour map on approx. Top of Paleozoic Unconformity
      b. Isopach map Paleozoic Unconformity - Devonian Nisku

   4. Shot point locations and elevation map.

Lic. No. 100 — Noranda Exploration - 1964

Welby - Binscarth Area — Twps 17-19, Rge 29 WPM

A. Summary letter

B. Maps:

Lic. No. 100 Cont'd.

1. Structure contour maps:
   a. Top of Mississippian
   b. Top of Prairie Evaporite

2. Shot hole location map with lithology

Lic. No. 103 — Frontier Oil & Gas Ltd. - 1965

Kemnay Area — Twps 10, 11, Rges 19, 20 WPM

A. Shot hole location map

B. Film containing:

1. Drilling reports
2. Seismic records
3. Shot field data
4. Observers report
5. Survey notes

No report submitted

Lic. No. 105 — Tenneco Oils - 1966

Kirkella Area — Twps 10-13, Rge 29 WPM

A. Report of seismic survey

B. Maps:
   1. Structure:
      a. First White Specks
      b. Top of Jurassic
      c. Mississippian
      d. Nisku

   2. Isochron:
      a. First White Specks - Mississippian
      b. First White Specks - Prairie Evaporite
      c. First White Specks - Winnipegosis
      d. First White Specks - Cambrian

   3. Shot point location map

   4. Surface topography

C. Driller log

Lic. No. 106 — Canadian Pacific - 1966

S.W. Manitoba — Twps 1-8, Rges 23-29 WPM

A. Seismic report

B. Maps:
1. Seismic structure maps:
   a. Watrous
   b. Mississippian
   c. Birdbear
   d. Nisku
   e. Dawson Bay
   f. Precambrian

2. Shot point location maps, elevation and lithology.

Lic. No. 110 — Canadian Pacific - 1967

Melita Area — Twps 1-9, Rges 23-26 WPM

A. Summary report of seismic structure data

B. Maps:

1. Structure contour maps:
   a. Second White Specks
   b. Birdbear

2. Isopach maps:
   a. Second White Specks - Mississippian
   b. Watrous - Mississippian
   c. Mississippian - Birdbear
   d. Birdbear - Dawson Bay
   e. Dawson Bay - Precambrian

3. Surface elevations & shot hole logs

4. Location plot outlining shot point co-ordinate system

Lic. No. 112 — Northern Oil Explorers - 1967

Rock Lake Area — Twp 2, Rges 14, 15 WPM

A. Maps:

Lic. No. 112 Cont'd.

1. Isochron maps:
   a. Second White Specks to Duperow
   b. Second White Specks to Basement
   c. Duperow to Basement

2. Shot hole location map

No report submitted

Lic. No. 116 — Dekalb Petroleum - 1968

Waskada - Napinka Area — Twp 1, Rge 25 WPM

A. Maps:

Waskada Area

1. Structure Contour:
   a. Second White Specks
   b. Top of Mississippian
   c. Birdbear
   d. Winnipeg

2. Isopach
   a. Jurassic - Mississippian
   b. Jurassic - Birdbear
   c. Mississippian - Winnipeg
   d. Birdbear - Winnipeg

3. Shot point location and elevation map

Napinka Area — Twps 4, Rges 25, 26 WPM

A. One seismic line between — Twps 3, 4, Rges 25, 26.
Same Series as above.

Lic. No. 119 — Midwest Oil Corporation - 1968

Goodlands Area — Twps 2-3, Rge. 23 WPM
Deloraine Area — Twps 1-2, Rge. 24 WPM

A. Seismic report

Lic. No. 119 Cont'd.

B. Maps:
   1. Isopach maps:
      a. Second White Specks - Mississippian
      b. Second White Specks - Nisku
      c. Mississippian - Nisku

   2. Shot point location map

C. Drill logs

Lic. No. 123 — Union Oil - 1969

S.W. Manitoba

Napinka Area: — Twp 4, Rges 25 WPM

A. Geological report

B. Maps:
   1. Contour maps:
      a. Top of Mississippian
      b. Top of Devonian
      c. Approximate Winnipegosis

   2. Isochron map: Mississippian - Devonian

C. Drill logs

D. Survey elevation sheets

Waskada - Coulter Area: Twps 1, 2, Rges 25-27 WPM

A. Geological Report

B. Maps:
   1. Contour maps:
      a. Top of Mississippian
      b. Top of Bakken - 3 Forks
      c. Middle Devonian

   2. Isochron map:
      a. Mississippian - Bakken
      b. Middle Devonian - Ordovician

C. Drill logs

D. Survey elevation sheets

Lic. No. 123 Cont'd.

Melita Area: Twp 5, Rges 23 and Twps 4, Rges 25, 26

A. Geological report

B. Maps:
   1. Contour map:
      a. Top of Mississippian
      b. Approximate Nisku
      c. Approximate Winnipegosis

   2. Isochron:
      a. Top of Mississippian
      b. Approximate Nisku

C. Drill logs

D. Survey elevation sheets

Lic. No. 124 — Midwest Oil Corporation - 1969

Napinka Area — Twp 4, Rges 24, 25 WPM

A. Seismic Report

B. Maps:
   1. Structure maps:
      a. Second Specks Structure
      b. Jurassic Structure
      c. Nisku Structure
      d. Winnipeg Structure

   2. Isopach maps:
      a. Second specks to Jurassic Isochron
      b. Second specks to Nisku Isochron
      c. Nisku Structure to Nisku Isochron
      d. Nisku to Winnipeg Isochron

   3. Shot point location map

   4. Surface elevation

C. Drill Logs

Lic. No. 124 Cont'd.

Hernfield Area Twp 1, Rge 25 WPM

A. Seismic report

B. Maps:
   1. Structure maps:
      a. Blairmore Structure
      b. Mississippian Structure
      c. Nisku Structure
      d. Winnipeg Structure

   2. Isopach maps:
      a. Blairmore to Nisku Isochron
      b. Blairmore to Mississippian Isochron
      c. Mississippian to Nisku Isochron
      d. Nisku to Winnipeg Isochron

   3. Shot point location map

   4. Surface elevation

C. Drill logs

Geological and Geophysical Reservations:

Res. No. 91 — Golden Eagle Oil & gas & Chagos - 1966

Lulu Lake Area — Twp 1, Rge 21 WPM

A. Seismic report (review of 1947 survey by California Standard Lic. No. 1).

B. Maps:
   1. Seismic structure contour maps:
      a. Second White Specks
      b. Top of Mississippian
      c. Top of Devonian
      d. Top of Precambrian
      e. Surface elevations

   2. Seismic Isochron maps:
      a. Second White Specks - Top of Mississippian
      b. Top of Mississippian - Top of Devonian
      c. Top of Devonian - Precambrian

C. Seismic structure cross sections (eight) (a - b)

C) Other Geophysical Data

Geological and Geophysical Licences:

Lic. No. 1	California Standard - 1947
S.W. Manitoba	Twps 1-12, Rges 12-29 WPM
A. Maps:	
1. Portage la Prairie Area	
a. Observed Gravity	Twps 8-9, Rges 12-13 WPM
b. Gravity Station Elevation Map	
c. Observed Magnetic Contours	
2. Brandon Area	
a. Regional Gravity Map	Twps 7-12, Rges 13-21 WPM
b. Gravity Station Elevation Map	
c. Observed Gravity	Twps 7-11, Rges 14-17 WPM
d. Observed Magnetic Contours	Twps 8-10, Rges 14-17 WPM
3. Virden Area	
a. Raw Gravity	Twps 7-12, Rge 22 WPM
b. Gravity Station Elevation Map	Twp 7, Rge 23 WPM Twps 9-12, Rges 23-25 WPM Twps 11-12, Rges 26-27 WPM
4. Turtle Mountain Area	
a. Observed Gravity	Twps 1-3, Rges 21-24 WPM
b. Observed Magnetic Contours	Twps 1-2, Rges 21-24 WPM
c. Gravity Station Location & Elevation	Twps 1-6, Rges 22-26 WPM
5. Souris River Area	
a. Raw Gravity	Twps 3-8, Rges 22-29 WPM
6. Pelican Lake Area	
a. Raw Gravity	Twps 1-6, Rges 14-21 WPM
b. Gravity Station Location & Elevation	

Lic. No. 12 — Souris Valley Oil - 1950

Lyleton Area — Twps 1-5, Rges 24-29 WPM

I Gravity meter survey

A. Gravity meter report only
All maps missing

Lic. No. 13 — Hart Green - 1950

W & S of Morris — Twps 3 - 5, Rges 1-4 WPM

I Gravity meter survey

A. Gravity map and report

Lic. No. 22 — British American Oil - 1951

Grandview; Gilbert Plains Area — Twps 24-27, Rges 21-25 WPM

I Gravity meter & magnetometer surveys

A. Magnetometer report and maps

B. Gravity meter report and maps:
1. True Gravity Map showing interpretation
2. Residual Anomaly map
3. Location map showing gravity and magnetometer stations

Lic. No. 23 — British American Oil - 1951

Virden Area — W1/2 Twps 9-10, Rges 26 WPM
Twps 9-11, Rges 27-28 WPM
Twps 10, Rge 29 WPM

A. Gravity meter report

1. Gravity map
2. Residual anomaly map

B. Magnetometer report

1. Magnetometer map

Lic No. 28 — H.B. Parker - 1952

Duck Mountain Area — Twp 30, Rge 29 WPM

A. Aero-radiation report and profiles

Lic. No. 29 — Heath Gold Mines - 1952

Swan River Area — Twps 37, Rges 29 WPM

A. Aeromagnetic report and maps

Lic. No. 32 — Great Sweet Grass - 1952

Brandon Area — Twp 4, Rges 10-11 WPM
Twp 5, Rge 8 WPM
Twp 5-6, Rge 9 WPM

I Geomagnetic survey

A. Geomagnetic contour map and report

Lic. No. 33 — Colin Campbell - 1953

Bowsman Area — Twps 38, Rge. 28 WPM

A. Gravity meter report

B. Maps:
1. Regional and residual maps missing
2. Gravimeter station elevations map available

Lic. No. 34 — West Plains - 1953

Neepawa Area — Twps 13-14, Rges 14-17 WPM
Twps 14-15, Rges 13-15 WPM

I Geomagnetic survey

A. Geomagnetic report

B. Maps:
1. Geomagnetic contour map
2. Magnetic survey - Hope Claims (Iron Formatiom)

Lic. No. 35 — Britco Oils - 1952

Swan River Area — Twp 35, Rges 25, 26 WPM

A. Gravity meter report

B. Maps:
1. Residual gravity map
2. Regional gravity map
3. Gravimeter station elevations

Lic. No. 37 — Uscana Oils - 1953

Pilot Mound Area — Twp 1, Rges 9, 10 WPM
Twps 2-3, Rges 9-11 WPM

A. Gravity meter report

B. Maps:
1. Residual gravity
2. Regional gravity
3. Station locations and elevations

Lic. No. 43 — Imperial Oil - 1954

Brandon Area — Twps 1-15, Rges 14-29 WPM
Twps 2-3, Rges 9-11 WPM

I Aeromagnetic survey

A. Flight lines shown on topographic map

B. Maps:
1. Aeromagnetic map.

Lic. No. 53 — Great Sweet Grass - 1955

Duck Mountain — Twps 27-35, Rges 23-27 WPM

I Airborne radiation survey

A. Maps showing radiation profiles and interpretation.

Lic. No. 54 — Canadian Oil and Gas Reserves Ltd. - 1955

Swan River Area — Twps 33-35, Rges 26-28 WPM

I Radiation survey

A. Report on gamma ray survey with radiation profiles

B. Geological report

C. Report on oil and gas deposits (with map showing survey lines and assumed gas pocket).

Lic. No. 70 — California Standard - 1957

I Aeromagnetic survey — Twps 3-12, Rges 17-26 WPM

A. No report

B. Maps:
1. Aeromagnetic maps:
a. Twps 8-12, Rges 22-26 WPM
b. Twps 8-12, Rges 17-21 WPM
c. Twps 3-7, Rges 22-26 WPM
d. Twps 3-7, Rges 17-21 WPM

Lic. No. 85 — Sun Oil - 1960

Souris Hartney Area — Twps 5, 6, Rges 23-25 WPM

I Gravity meter survey

A. Maps:
1. Gravity - Observed isogal map - 0.2 milligal (1" = 4,000' (and progress maps with stations)

Lic No. 106 — Canadian Pacific - 1966

S.W. Manitoba

A. No report.

B. Maps:
1. Aeromagnetic maps on:

a. Waskada Tilston Area — Twps 1-2, Rges 17-29 WPM; Twps 3-12, Rges 27-29 WPM

Lic No. 106 Cont'd.

b. Hamiota Area — Twp 12, Rges 26-29 WPM
Twps 13-17, Rges 19-29 WPM

Computer derivative maps, by University of Manitoba

Lic No. 107 — Phoenix Canada Oil Co. -1966

Carman Area — Twp 6, Rges 2-6 WPM
Twps 7, 8 Rges 2-5 WPM

A. Gravity report and Bouguer anomaly map

Lic. No. 111 — Shell Canada Limited - 1967

Russell Area — Twps 19-23, Rges 26-29 WPM

I Gravimetric survey

A. Geophysical report

B. Maps:

1. Residual Gravity 1.9
2. Gravity residual Bouguer values corrected with 1.9
3. Bouguer
4. Sixth degree residual 1.9
5. Sixth degree regional 1.9
6. Bouguer Gravity
7. Sixth degree regional
8 Sixth degree residual
9. Regional derived from Bouguer Gravity
10. Trend Analysis - Third Degree Residual Map
11. Surface Elevation Map

Lic. No. 115 — Greater Winnipeg Gas Co. - 1968

Carman Area — Twps 7-12, Rges 1-7 WPM

A. Vertical magnetic survey map

Lic. No. 116 — Dekalb Petroleum Corporation -1968

Gravity meter survey

Waskada	Twps 1-3, Rges 23-27 WPM
Napinka	Twp 4, Rges 23-26 WPM

A. Maps
1. Residual gravity map
2. Residual gravity - 5,000' circle
3. Bouguer gravity
4. Ground elevation

B. Gravity meter data sheets, all stations (213 sheets)

All Maps: scale 2" = 1 mile, same series of maps for both areas.

Lic. No. 118 — Sinclair Canada Oil - 1968

McCreary Area — Twps 19-25, Rges 14-16 WPM

I Gravity meter survey

A. Report - Final interpretation, gravity and magnetic data.

B. Maps:
1. Bouguer Gravity Maps
2. 9th Polynomial residual gravity map
3. 9th Polynomial residual gravity map - with interpretation of gravity & magnetics
4. Surface elevation map
5. Magnetic map

C. Trend analysis of gravity readings, computer sheets

D. Raw gravity data tables

Lic. No. 129 — Husky - 1969

Dawson Bay Area — Twps 44-46, Rges 24-28 WPM

I Electromagnetic survey, inert gas

A. Input EM survey report

B. Input anomaly maps, photomosaic base, 1" = 1/2 mi.
a - c five separate map sheets

C. Input tapes and 35 mm. photography for flight lines

Lic. No. 135 — S.P. Jordan - 1975

Virden Area — Twps 9-13, Rges 25-27 WPM
Waskada Area — Twps 1, 2, Rge 25 WPM

I Electromagnetic survey

A. Geologic report
1. Prospective Hydrocarbon Area Map
2. Three Geological Cross-Sections

B. Resistivity survey for Waskada Area

C. Resistivity survey for Virden Area

Lic. No. 165 — International Minerals and Chemical Corporation - December 1980

St. Lazare Area

A. Seismic report

B. Maps
1. Seismic Structure contour maps:
a. Top of Prairie Evaporite
b. Top of Winnipegosis
c. Geological Structure of Prairie Evaporite
d. Top of Prairie Evaporite Structure in Time

2. Seismic Isochron maps:
a. Blairmore formation isopach
b. Prairie Evaporite to Winnipegosis
c. Amplitude Anomalies at the Mississippian and the Upper Devonian levels

Lic. No. 165 (cont'd)

C. Seismic section (one); synthetic seismogram (one); sonigram (one)

Geological and Geophysical Reservations:

Res. No. 83-86 — Kewanee - Ashland - 1965

Roblin - Durban Area — Twps 25, 26, Rge 28 WPM; Twps 33, 34, Rge 29 WPM

I Gravity meter survey

A. Summary geological report

B. Report, maps and data tables: Gravity survey of Benito Area (surface elevation, Bouguer gravity, residual gravity profiles).

Res. No. 87-90 — Union Oil - 1965

Duck Mountain Area — Twps 29-32, Rge 29 WPM

I Gravity meter survey

A. Gravity survey report (field procedure; data table and maps - surface elevation, Bouguer gravity, residual gravity (2"=1Mi,), residual gravity profiles).

B. Interpretation of gravity results

Res. No. 107-111 — Central Del Rio Oils - 1968

Porcupine Hills Area — Twps 36-40, Rges 28-32 WPM

I Airborne magnetometer survey

A. Report on airborne megnetometer survey - methods and data processing.

B. Maps:
1. Geomagnetic survey maps:
a. Vertical gradient
b. Total magnetic intensity map

Airborne Radiation Survey — Souris Valley - 1954

S.W. Manitoba

Virden Area: NE Section - Twps 9-11, Rges 24-26 WPM

Waskada Area: SE Section - Twps 1-3, Rges 23-27 WPM

Pierson Area: SW Section - Twps 1-3, Rges 27-30 WPM

Tilston Area: NW Section - Twps 7-11, Rges 27-29 WPM

A. Final Report

B. Maps:
1. Interpretation of the results of airborne radiation survey
2. Results of survey showing radium count only
3. Outline of different soils
4. Interpretation of radiation survey - by detailed contouring
5. Interpretation of radiation survey showing radium pattern over the Daly Field - 1 map - Twps 8-11, Rges 24-29 WPM
6. Results of survey showing recordings of the total radiation plotted along the flight lines - 1 map - NE Section

Composite Magnetic Anomaly Map

S. W. Manitoba — Twps 1-28, Rges 12-29 WPM

Scale 1" = 4 miles

This is a composite of six separate magnetic maps submitted to the Mines Branch in respect of exploratory work done under Geological and Geophysical Licenses and/or Reservations. No attempt has been made to reconcile the data for the individual map areas. The area of each individual survey is noted along with reference. The contours and contour values are as shown on the originals, although some contour lines have been omitted where necessary. Note that some surveys are ground magnetometer, others are airborne.

Composite Gravity Anomaly Map

S. W. Manitoba Twps 1-25, Rges 4-29 WPM

Scale 1" = 4 miles

Based on data from Dominion Ovservatories Branch (Maps 39, 47)

Bouguer Anomaly Values in Tenths of Milligals

Bouguer Control Interval = 5 Milligals

D) HUDSON BAY LOWLANDS DATA

Exploration Permits

PERMITS 1 - 35 — Aquitane Company of Canada Ltd. - 1962

A. General geological reconnaissance of Hudson Bay, 1968 by S. Rueff and S. Artru, 1969.

B. Kaskattama #1 Well - Micro facies, stratigraphic and geochemical studies, 1968.

C. Preliminary report of interpretation of aeromagnetic profiles, southwest Hudson Bay - Hunting, 1962.

D. Report of the interpretation of an airborne magnetic survey of an area near York Factory, Manitoba - Hunting, 1963.

E. Summary letter - geologic exploration considerations of the Hudson Bay area - R.D. Johnson, 1963.

F. Geological reconnaissance, Southampton, Coats and Mansel Islands - R.D. Johnson, 1963.

G. Shore-fast ice reconnaissance, Fort Churchill to Cape Tatnam,. Hudson Bay - R.D. Johnson, 1963.

H. General reconnaissance, Severn River, Ontario - R.D. Johnson, 1963.

I. Oil Shale Exploration, Southampton Island - R.D. Johnson, 1964.

J. Geological and geophysical exploration, Capt Tatnam, Manitoba - R.D. Johnson, 1964.

K. Stratigraphy and petroleum possibilities of the northern Hudson Bay Lowland, Manitoba - S.J. Nelson, 1962.

L. Paleontology of Sogepet field party collections, Hudson Bay area - S.J. Nelson, 1963.

M. Report on search for coal deposits, Churchill, Manitoba area - S.J. Nelson, 1964.

N. Devonian of the northern Hudson Bay Lowland, Cape Tatnam region, Manitoba and Ontario - S.J. Nelson, 1964.

O. The oil shales of Southampton Island, Northwest Territories - S.J. Nelson, 1965.

P. Paleontology of Sogepet Aquitaine Kaskattama #1 Well - S.J. Nelson, 1967.

Q. Well site geological and engineering summary, Sogepet Aquitaine Kaskattama #1 - 1967 (including supplement).

R. Report on a refraction seismic survey of the Hudson Bay Lowlands, Manitoba - Hunting, 1964.

S. Terrain and geomorphic studies with maps and photomosaics.

T. Study of samples collected around Hudson Bay Lowlands and Northern Island, 1968 - S. Rueff and P. Artru. Comparisons with Kaskattama #1 Well. See also revised edition, 1970.

PERMITS 36 - 46 — Houston Oils Limited - 1967

A. Gravity Survey report, with maps:
   1. Map - Station elevations (2" = 1 mi.)
   2. Map - Bouguer gravity, C.I. = 0.5 mg.
   3. Map - Bouguer gravity, (Galiski), C.I. - 0.2 mg.
   4. Plate - Gravity lines 1-4
   5. Plate - Gravity lines 5-8
   6. Plate - Gravity lines 9-12
   7. Map - Residual gravity, C.I. = 0.2 mg.

B. Geological and Engineering Report on Houston et al Comeault Prov. STH No. 1

PERMITS 47 - 57 — City Savings Trust - 1967

A - K Photogeological reports - Fracture analysis survey. (Eleven separate reports, one for each Permit area).

PERMITS 58 - 68 — Northwest Oils - 1968

A. Well drilling report, Whitebear Creek #1 (57° N, 92° 27' W.)

B. Report on aeromagnetic interpretation. Rupert Creek area, Hudson Bay, Manitoba; with interpretation map.

PERMITS 69 - 74 — Kanata Exploration Co. - 1968

A. Aeromagnetic interpretation, York Factory area, Hudson Bay, Manitoba

B. Memorandum report on reconnaissance field work, Hudson Bay Lowlands, Manitoba (re: reported oil seepage).

E) OIL SHALE EXPLORATION DATA

South West Manitoba

Res. No. 1 - 8, 10 — Sun Oil Co. - 1965

Porcupine Forest & Duck Mountain Area — Twps 24-44, Rges 20-29 WPM

A. Geological report

B. Maps:
1. Map of outcrop shale with core hole locations
2. Map of oil shale (Favel) lands with cross-section of topography and the Favel Formation

C. Report of Research on Saskatchewan and Manitoba Oil Shales.

By: I ..ard W. Ince Recovery Research, 1966

Res. No. 9 — Aquitane Co. of Canada Ltd.- 1965

Riding Mountain Area — Twps 15-20, Rges 15-17 WPM

A. Study from old notes about oil shales

B. General geological map of Manitoba from compiled data

C. Field notes

D. Lithologic examination of field samples, geochemical examination, and Fisher Analysis results

E. Final examination & drilling program

F. Maps:
1. Reservation map with contours on base of Favel Formation
2. Cross-sections to base of Favel (5)
3. Litholog description of core holes (6)
4. Location plats of core holes (15)

Res. No. 11 - 13 — Atlantic Refining - 1965

Treherne Area — Twps 1-14, Rges 4-17 WPM

A. Four holes cored to base of Favel Formation

1. Core log, and chemical analysis for the following core hole locations:
   a. 1 - 16 - 11 - 16 W1
   b. 16 - 11 - 8 - 11 W1
   c. 2 - 9 - 6 - 8 W1
   d. 1 - 27 - 1 - 16 W1

B. Cores available at core shed

C. Maps and cross-sections:
1. Oil shale reconnaissance map of the Manitoba escarpment.
2. Structural cross-section showing outcrop of Cretaceous.

OIL SHALE

Special Projects

Amoco - 1964

A. Tar sand analysis on oil shale samples from the following wells:

11-9-1-27 W1
1-27-17-26 W1

Shell Canada Ltd. - 1965

A. Oil source-bed analysis of Winnipeg shale from the following wells:

16-33-4-13 W1
5-13-5-22 W1
2-20-11-24 W1

F) HELIUM EXPLORATION DATA

Res. No. 1 & 2 — Hemisphere Helium Corporation Ltd. - 1961

Res. No. 1

East Lake Manitoba — Twps 19-22, Rges 5-7 WPM

Res. No . 2

West Lake Manitoba — Twps 9-23, Rges 7-16 WPM

A. Progress report on helium exploration operations in Manitoba. A cross-section of the Winnipeg Formation showing possible helium entrapment.

By: J. Sabo
R. Adair Oil Management

B. Helium and hydrocarbon possibilities, Lake Manitoba Area, Manitoba.

By: R,. Edie
1. Geological cross-section, east-west, showing possible hydrocarbon traps in the upper Jurassic sands and possible hydrocarbon and helium entrapment in the Winnipeg Sand.

2. Map of Lake Manitoba showing Precambrian tests and outcrops of various stratigraphic units.

Res. A, B, C — Bralorne Petroleums - 1966

East Lake Manitoba — Twps 20-34, Rges 1-10 WPM

A. Macrofracture pattern analysis survey of Fisherton Area - Interlake Region, Manitoba.

By: M. Berisoff.

B. Maps:
1. Macrofracture pattern analysis map
2. Major linear trends

Geological and Geophysical Licence No. 129

Husky - 1970

Dawson Bay Area Twps 44-46, Rges 24-28 WPM

A. Geological and geophysical investigation was run mainly exploring for helium gas.

B. Correspondence and technical data are available in G. & G. Licence No. 129 file.

G) LIST OF REPORTS ON VELOCITY SURVEYS

Well Name	Location	WPM	Base (ft.)	Deepest Unit	Yr.
B.A. UNION ARBUCKLE	13 24	1 12	3448	PRECAMBRIAN	56
FOSCA FLOSSY LK.	10 21	1 23	4089	NISKU	56
IMP. CHEVRON HERNEFIELD PROV.	1 30	1 25	4285	DUPEROW	56
OMEGA WASKADA	11 30	1 25	3051	TILSTON	67
CHEVRON WASKADA	9 13	1 26	5170	DEVONIAN	52
LANDA MOORE	5 20	1 27	5856	DEVONIAN	49
CPOG LYLETON	1 16	1 28	4550	DEVONIAN	67
FOSCA HALLAM LYLETON	15 5	1 29	4095	LODGEPOLE	55
IMPERIAL COPLEY	11 18	1 29	3764	MISSION CANYON	56
JUMPING POUND HORTON	8 15	2 20	5353	PRECAMBRIAN	57
OWEN MOUNTAINSIDE PROV.	8 11	2 22	3588	DEVONIAN	52
CHEVRON IMPERIAL DALNY	8 10	2 26	3395	LODGEPOLE	57
CHEVRON IMPERIAL S. ELVA	13 30	2 27	3485	LODGEPOLE	57
CHEVRON WHITEWATER	15 36	3 22	4088	INTERLAKE	54
CHEVRON IMP. N. GOODLANDS	16 9	3 24	2895	LODGEPOLE	56
FOSCA INNES ELVA	4 17	3 27	3290	LODGEPOLE	56
IMP. CAN. SUP. PIERSON	8 26	3 29	3485	LODGEPOLE	55
CECO CAYUGA	13 31	3 29	3625	LODGEPOLE	56
IMPERIAL REGENT	12 10	4 22	2710	LODGEPOLE	55
IMPERIAL DAND	1 13	4 23	2740	LODGEPOLE	57
CHEVRON IMPERIAL NAPINKA	2 7	4 25	2882	LODGEPOLE	57
IMPERIAL WEST BRENDA	13 17	4 26	3452	DEVONIAN	55

Well Name	Location	WPM	Base (ft.)	Deepest Unit	Yr.
B.A. MACLEAN PROV.	2 11	4 28	3338	LODGEPOLE	59
IMPERIAL CHEVRON EUNOLA	4 28	4 29	4045	NISKU	56
IMPERIAL UNDERHILL	4 8	5 22	2960	DUPEROW	55
IMPERIAL CAN. SUP. ARGUE	15 13	5 23	2900	DUPEROW	56
IMPERIAL CAN. SUP. ARGUE	5 33	5 23	2800	NISKU	56
ROYALITE LAUDER	7 27	5 24	3980	SILURIAN	52
CHEVRON HARTNEY	16 33	5 24	5136	PRECAMBRIAN	50
CHEVRON IMP. RUTH	1 17	5 26	2820	LODGEPOLE	57
SUN BROOMHILL	5 30	5 26	2802	MISSISSIPPIAN	67
B.A. TWEED BEDE	13 13	5 27	2910	LODGEPOLE	61
B.A. GERVIN BROOMHILL	1 20	5 27	2997	LODGEPOLE	61
U.S. SMELTING HARTNEY	1 35	6 23	2470	LODGEPOLE	55
SAPPHIRE S. PIPESTONE PROV.	12 24	6 26	2960	JURASSIC	54
CHEVRON RESTON	7 27	6 27	3287	NISKU	52
M & C SOURIS	16 20	7 21	2131	NISKU	54
CHEVRON FINDLAY	9 26	7 25	4056	SILURIAN	52
CHEVRON LINKLATER	2 21	7 28	4960	DEVONIAN	52
SOCONY MOBIL JACKSON CR. PROV.	11 30	7 29	3611	NISKU	63
CHEVRON WAWANESA	3 1	8 18	3814	PRECAMBRIAN	51
SMITH AGNEW	13 27	8 26	2750	NISKU	55
CHEVRON EWART PROV.	4 14	8 28	4818	SILURIAN	51
DOME BRANDON	3 5	9 19	3995	WINNIPEG	56

Well Name	Location	WPM	Base (ft.)	Deepest Unit	Yr.
DOME BRANDON	16 27	9 19	3437	ORDOVICIAN	57
MINERALOID ROUTLEDGE	14 28	9 25	2135	LODGEPOLE	55
HEVRON WOODNORTH PROV.	5 18	9 27	3645	DEVONIAN	52
CHEVRON WEST BUTLER	1 31	9 29	3020	LYLETON	55
B.A. LAVENHAM PROV.	5 3	10 10	2325	PRECAMBRIAN	56
PEACOCK KEMNAY	13 4	10 20	1900	NISKU	57
NEW SCOPE MAPLES	6 9	10 26	2110	MISSISSIPPIAN	55
CHEVRON S. VIRDEN PROV.	16 11	10 26	2069	LODGEPOLE	56
CHEVRON DALY PROV.	7 12	10 28	2529	MISSISSIPPIAN	51
DOME HARDING	4 27	11 22	4060	PRECAMBRIAN	56
BAYSEL E. SCALLION	2 10	11 25	2100	LODGEPOLE	55
BAYSEL CALSTAN HARGRAVE PROV.	15 16	11 27	2927	DEVONIAN	51
IMPERIAL BLOSSOM	3 17	12 24	4495	PRECAMBRIAN	54
H.W. & L. EAST SCALLION	5 1	12 26	2313	NISKU	57
CHEVRON KIRKELLA	13 4	12 29	2485	MISSISSIPPIAN	55
LANGFORD NEEPAWA	5 29	14 14	2490	PRECAMBRIAN	47
DOME MINNEDOSA	16 26	14 18	3559	PRECAMBRIAN	57
HOMESTEAD BIRDTAIL	10 8	15 27	3465	INTERLAKE	56
HOMESTEAD BIRDTAIL	9 21	15 27	3395	SILURIAN	53
DOME STRATHCLAIR	8 34	16 21	3920	PRECAMBRIAN	56
DOME NACO LAZARE PROV.	12 34	16 29	4135	RED RIVER	55
IMPERIAL BIRTLE	1 27	17 26	4254	WINNIPEG	51
IMPERIAL MADELINE PROV.	16 18	18 29	4456	PRECAMBRIAN	51

Well Name	Location	WPM	Base (ft.)	Deepest Unit	Yr.
PAN AM FOXWARREN PROV.	10 4	19 26	3249	SILURIAN	66
SHELL SWAN RIVER PROV.	13 3	35 29	2497	PRECAMBRIAN	52
Far North:					
SOGEPET AQUIT KASKATTAMA	K23 57	90 04	2913	PRECAMBRIAN	67